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A contribution to the knowledge of the order *Quercetalia ilicis* Br.-Bl. *ex* Molinier 1934 of Sardinia

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Abstract

A syntaxonomic revision of the holm-oak and cork-oak woods of Sardinia is here presented. The geological and phytoclimatic heterogeneity of the island and the wide ecological amplitude of the holm-oak, result in a large phytocoenotic diversity of the Sardinian holm-oak woods. These are referred to five associations: *Pyro amygdaliformis-Quercetum ilicis*, *Prasio majoris-Quercetum ilicis* ass. nova, *Galio scabri-Quercetum ilicis*, *Saniculo europaeae-Quercetum ilicis* ass. nova and *Aceri monspessulani-Quercetum ilicis*. From the phytogeographic point of view, in the subhumid-humid, meso-supramediterranean bioclimatic belts of Sardinia the presence of the association *Galio scabri-Quercetum ilicis* is found to be remarkable.

As far as the cork-oak woods are concerned, the associations *Galio scabri-Quercetum suberis* and *Violo dehnhardtii-Quercetum suberis* ass. nova are here reported.

The Sardinian-Corsican holm-oak and cork-oak woods define the western limit of the European central-Mediterranean alliance *Fraxino orni-Quercion ilicis* of which in Sardinia there are many characteristic and differential entities. In the Sardinian-Corsican holm-oak woods, however, there are endemic entities (*Arum pictum* ssp. *pictum*, *Helleborus lividus* ssp. *corsicus*, *Digitalis purpurea* var. *gyspergerae*, *Quercus ichnusae* and *Paeonia morisii*) and other western-centred entities with little or no spread on the Italian peninsula (*Galium scabrum*, *Clematis cirrhosa* and *Teucrium scorodonia*). These entities allow the proposal that within the alliance *Fraxino orni-Quercion ilicis* can be recognised the new Sardinian-Corsican suballiance *Clematido cirrhosae-Quercenion ilicis* (typus: *Prasio majoris-Quercetum ilicis* ass. nova), which is endemic to the Sardinian and Corsican sectors of the Italo-Tyrrhenian Province. Consequently, the suballiance *Fraxino orni-Quercenion ilicis*, which is the typical of the alliance *Fraxino orni-Quercion ilicis*, has also been proposed.

Key words: *Clematido cirrhosae-Quercenion ilicis*, cork-oak woods, Corsica, holm-oak woods, phytosociology, Sardinia, synchorology, syntaxonomy.

Riassunto

Contributo alla conoscenza dell'ordine Quercetalia ilicis *Br.-Bl.* ex *Molinier 1934 della Sardegna*. Viene presentata una revisione sintassonomica delle leccete e delle sugherete della Sardegna. L'eterogeneità geologica e fitoclimatica dell'isola e l'ampia valenza ecologica che vi presenta il leccio determinano la notevole diversità fitocenotica delle leccete sarde. Queste vengono riferite a 5 associazioni: *Pyro amygdaliformis-Quercetum ilicis*, *Prasio majoris-Quercetum ilicis* ass. nova, *Galio scabri-Quercetum ilicis*, *Saniculo europaeae-Quercetum ilicis* ass. nova e *Aceri monspessulani-Quercetum ilicis*. Dal punto di vista fitogeografico si ritiene importante la presenza, nel piano bioclimatico meso-supramediterraneo, subumido-umido della Sardegna, dell'associazione *Galio scabri-Quercetum ilicis*.

Per le sugherete vengono riconosciute le associazioni: *Galio scabri-Quercetum suberis* e *Violo dehnhardtii-Quercetum suberis* ass. nova.

Le leccete e le sugherete sardo-corse costituiscono la propaggine occidentale dell'alleanza centro-mediterranea europea *Fraxino orni-Quercion ilicis* della quale in Sardegna sono presenti numerose entità caratteristiche e differenziali. Nelle leccete sardo-corse tuttavia sono presenti entità endemiche (*Arum pictum* ssp. *pictum*, *Helleborus lividus* ssp. *corsicus*, *Digitalis purpurea* var. *gyspergerae*, *Quercus ichnusae*, *Paeonia morisii*) ed altre entità a baricentro occidentale poco o nulla diffuse nella penisola italiana (*Galium scabrum*, *Clematis cirrhosa* e *Teucrium scorodonia*) le quali consentono di proporre, nell'ambito dell'alleanza *Fraxino orni-Quercion ilicis*, la nuova suballeanza sardo-corsa *Clematido cirrhosae-Quercenion ilicis* (typus: *Prasio majoris-Quercetum ilicis* ass. nova) quale endemica dei settori sardo e corso della Provincia Italo-Tirrenica. Viene pertanto istituita anche la suballeanza *Fraxino orni-Quercenion ilicis* tipica dell'alleanza *Fraxino orni-Quercion ilicis.*

Parole chiave: *Clematido cirrhosae-Quercenion ilicis*, Corsica, fitosociologia, leccete, Sardegna, sincorologia, sintassonomia, sugherete.

Introduction

The present contribution is intended to provide new knowledge of the holm-oak and cork-oak woods of Sardinia and of their syntaxonomic classification. The *Quercus ilex* woods are presented first, followed by those of *Quercus suber*.

Materials and Methods

For the vegetation analysis, 127 phytosociological relevées, were performed according to the method of the sigmatist school of Zurich-Montpellier (Braun-Blanquet, 1951). For the syntaxonomy, the standards contained in the third edition of the International Code

of Phytosociological Nomenclature (Weber *et al.*, 2000), as translated into Italian by Scoppola (Weber *et al.*, 2002), have been followed.

For the taxonomic nomenclature, reference has been made to: Med-Checklist (Greuter *et al.*, 1984-89), *Atlas Florae Europaeae* (Jalas & Suominen, 1972-1994; Jalas *et al.*, 1996), *Flora Europaea* (Tutin *et al.*, 1964-80; 1993), *Flora d'Italia* (Pignatti, 1982), *Le Piante Endemiche della Sardegna* (Arrigoni *et al.*, 1977-1991), Cesca *et al.* (2001) for the genus *Paeonia* L. and Rossellò & Sàez (1998) for *Arum pictum* s.l. Author abbreviations follow Brummit & Powell (1992).

The biological forms were verified directly in the field and they are expressed according to the classification of Raunkiaer (1934), following the abbreviations reported in Pignatti (1982).

The holm-oak woods

The holm-oak woods dominate the forest landscape of Sardinia (Arrigoni, 1968; Giacomini & Fenaroli, 1958; Pignatti, 1998), because *Quercus ilex* has a wide ecological amplitude on the island, ranging from sea level to above 1400 m (Camarda & Valsecchi, 1983). *Q. ilex* woods are present on a range of pedological and lithological substrata and in the subhumid-humid, Mesomediterranean phytoclimatic belt (Barbero *et al.*, 1992). They are found to be particularly widespread also as a result of human activities (Reille & Pons, 1992).

To date, the phytosociological interpretation of the holm-oak woods has not been in full agreement. Some contributions have referred them to a single association, as proposed by Pignatti (1998), who assigned them all to the association *Viburno-Quercetum ilicis* (Br.-Bl. 1936), Rivas-Martínez 1975 (= *Quercetum ilicis galloprovinciale* Br.-Bl. 1936), specific of the Catalan-Provencal territories. Other studies, however, have attempted to differentiate the holm-oak associations ecologically, based upon climatic and edaphic parameters. For the central-eastern Mesozoic limestones Arrigoni *et al.* (1990) reported three different associations: *Pistacio-Quercetum ilicis* Brullo & Marcenò 1984 at an average altitude of 305 m; *Viburno-Quercetum ilicis* at an average altitude of 701 m; and *Aceri monspessulani-Quercetum ilicis* Arrigoni, Di Tommaso & Mele 1985 at altitude above 800 m. Also for Sulcis, in south-western Sardinia, Camarda *et al.* (1995) indicated two distinct associations, falling into two distinct phytoclimatic belts: *Viburno-Quercetum ilicis* between 400 and 700 m and *Asplenio-Quercetum ilicis* Rivas-Martínez 1975 over 700 m. For the subregion of Nurra, in north-western Sardinia, Biondi *et al.* (2001) recognised the association *Pistacio-Quercetum ilicis* on the limestone substrata and *Erico-Quercetum ilicis* Brullo 1977 on the Paleozoic schist, and described the mesophilous association *Pyro amygdaliformis-Quercetum ilicis* on the clay of the plain areas, all in the thermomediterranean belt. More recently, Ubaldi (2003) recognised for Sardinia the association *Aceri monspessulani-Quercetum ilicis* as montane-submontane of the limestones, and proposed the associations *Clematido cirrhosae-Quercetum ilicis* as high-hilly on limestones and *Allio triquetri-Quercetum ilicis* as submontane on the gneiss. Moreover, he proposed the new Sardinian suballiance *Galio scabri-Quercenion ilicis* (typus: *Aceri monspessulani-Quercetum ilicis*) within the alliance *Quercion ilicis* Br.-Bl. (1931) 1936. This suballiance includes the Sardinian holm-oak woods, from high-hilly to low-montane, and it is differentiated by: *Galium scabrum*, *Allium subhirsutum*, *Ceterach officinarum*, *Epipactis microphylla*, *Polypodium cambricum* and *Luzula forsteri*.

Soon afterwards Rivas-Martínez *et al.* (2003) recognised in Sardinia, within the alliance *Quercion ilicis* Br.-Bl. *ex* Molinier 1934 (suballiance *Quercenion ilicis*), the associations: *Pyro amygdaliformis-Quercetum ilicis* as dry thermomediterranean; *Aceri monspessulani-Quercetum ilicis* as subhumid and humid, Supramediterranean and, ignoring the proposal of Ubaldi (2003), published a few months before, proposed the association *Clematido cirrhosae-Quercetum ilicis*, which grouped together the Sardinian subhumid, mesomediterranean holm-oak woods. This last is thus to be considered as a later homonym.

Finally in a syntaxonomic revision of the European central-Mediterranean holm-oak woods, Biondi *et al.* (2003) referred the Sardinian holm-oak woods to the proposed alliance *Fraxino orni-Quercion ilicis*. This includes all the holm-oak woods of the Adriatic, Apennine-Balcan and Italo-Tyrrhenian biogeographic provinces (*sensu* Rivas-Martínez *et al.*, 2001), as distinct from those of the Balearic-Catalan-Provencal province that are referred to the alliance *Quercion ilicis* Br.-Bl. *ex* Molinier 1934 (Rivas-Martínez *et al.*, 2002).

Results and Discussion

The elaboration of the phytosociological relevées has allowed to recognise the following associations: *Pyro amygdaliformis-Quercetum ilicis*, *Prasio majoris-Quercetum ilicis* ass. nova, *Galio scabri-Quercetum ilicis, Saniculo europaeae-Quercetum ilicis* ass. nova and *Aceri monspessulani-Quercetum ilicis*.

1. *PYRO AMYGDALIFORMIS-QUERCETUM ILICIS* Biondi, Filigheddu & Farris, 2001 (typus rel. n. 1 of Tab. 63 in Biondi, Filigheddu & Farris, 2001; reported in Tab. 1, rel. n. 4 of the present study), Fig. 1.

This association includes the edapho-mesophilous holm-oak and cork-oak vegetation of the alluvial plains of a mixed clay-sand matrix, on soils that are moderately hydromorphic and are found in the upper thermomediterranean, upper dry belt. Characteristic and differential species are: *Myrtus communis*, *Quercus suber* and *Pyrus amygdaliformis*. Although this association has been individuated only on the Nurra plain (Biondi *et al*., 2001) it is believed that it represents the potential vegetation of the coastal and internal plains of Sardinia (Alto Campidano, Media Valle del Tirso, Piana di Chilivani), where the woods of the plain areas have been cut to favour intense pastoral and agricultural usages.

2. *PRASIO MAJORIS-QUERCETUM ILICIS* ass. nova hoc loco (holotypus rel. n. 3, Tab. 2), Fig. 2.
SYNONYMS: *Clematido cirrhosae-Pistacietum lentisci* Gamisans & Muracciole 1985 corr. Géhu & Biondi 1994 *quercetosum ilicis n. n.* (Gamisans 1990) *sensu* Gamisans, 1991 (Art. 5); *Clematido cirrhosae-Quercetum ilicis n. n.* Biondi *et al*., 1997 (Art. 3b, Art. 5).
PSEUDONYMS: *Viburno-Quercetum ilicis* (Br.-Bl.) Rivas-

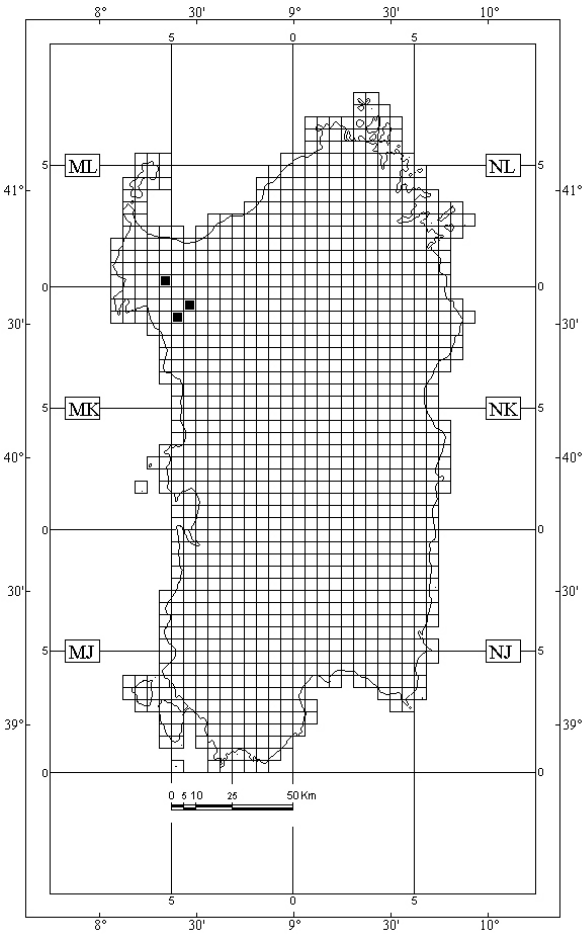

Fig. 1 - Relevées location of the ass. *Pyro amygdaliformis-Quercetum ilicis* = ■

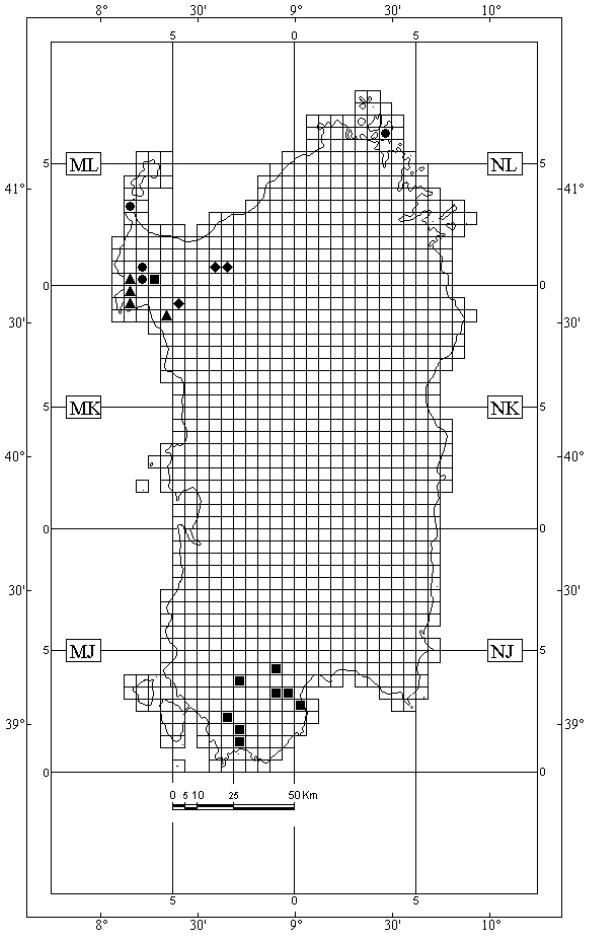

Fig. 2 - Relevées location of the ass. *Prasio majoris-Quercetum ilicis* ass. nova (*quercetosum ilicis* subass. nova = ■; *chamaeropetosum humilis* subass. nova = ▲; *phillyreetosum angustifoliae* subass. nova = ●; *quercetosum virgilianae* subass. nova = ◆)

Tab. 1 - *Pyro amygdaliformis-Quercetum ilicis* Biondi, Filigheddu & Farris 2001

	Rel. n.	1	2	3	4	5	P
	Altitude (m slm)	150	50	50	50	50	r
	Exposure	N	0	0	0	0	e
	Slope (°)	20	0	0	0	0	s.
	Substratum (All=Alluvial)	All	All	All	All	All	
	Stone percentage (%)	10	0	5	5	5	
	Area (m^2)	100	50	200	200	150	
	Coverage (%)	100	100	100	100	100	
	Average vegetation height (m)	6	6	12	9	10	
	Charact. and diff. taxa of the ass.						
P scap	*Quercus ilex* L.	4	3	1	5	4	5
P scap	*Quercus suber* L.	1	1	4	1	3	5
P caesp	*Myrtus communis* L.	3	.	1	1	2	4
P caesp	*Pyrus amygdaliformis* Vill.	.	1	1	1	1	4
	Charact. and diff. taxa of the *Clematido cirrhosae-Quercenion ilicis* suball. and of the *Fraxino orni-Quercion ilicis* all.						
P lian	*Clematis cirrhosa* L.	2	1	+	1	.	4
G rad	*Tamus communis* L.	2	+	.	.	.	2
	Charact. and diff. taxa of the upper units						
NP	*Smilax aspera* L.	1	1	2	2	2	5
P lian	*Rubia peregrina* L.	1	+	+	+	+	5
G rhiz	*Asparagus acutifolius* L.	1	+	+	+	+	5
P lian	*Lonicera implexa* Aiton	+	+	1	1	2	5
NP	*Rosa sempervirens* L.	2	+	+	+	+	5
P caesp	*Erica arborea* L.	1	.	.	.	.	1
H caesp	*Carex distachya* Desf.	1	.	.	.	.	1
H ros	*Asplenium onopteris* L.	1	.	.	.	.	1
H scap	*Pulicaria odora* (L.) Rchb.	1	.	.	.	.	1
P caesp	*Phillyrea latifolia* L.	.	.	.	+	.	1
P caesp	*Calicotome spinosa* (L.) Link	+	.	.	.	.	1
	Charact. and diff. taxa of the *Oleo-Ceratonion* all. and of the *Pistacio-Rhamnetalia alaterni* ord.						
P caesp	*Pistacia lentiscus* L.	1	2	3	2	2	5
G rhiz	*Arisarum vulgare* Targ.-Tozz.	3	1	2	2	2	5
P caesp	*Rhamnus alaternus* L.	.	2	1	1	1	4
NP	*Chamaerops humilis* L.	.	+	.	1	1	3
P caesp	*Olea europaea* L. var. *sylvestris* Brot.	1	.	.	+	+	3
	Other species						
NP	*Rubus ulmifolius* Schott	1	+	1	.	+	4
P caesp	*Crataegus monogyna* Jacq.	.	.	1	1	1	3
NP	*Osyris alba* L.	.	.	+	1	1	3
G rhiz	*Arum italicum* Mill.	.	.	+	1	1	3
H caesp	*Brachypodium retusum* (Pers.) Beauv.	.	.	+	+	+	3
G bulb	*Allium triquetrum* L.	+	.	.	.	+	2
G rhiz	*Ambrosinia bassii* L.	1	.	.	.	+	2
	Accidental species	1	1	0	1	2	

Martínez *pistacietosum sensu* Arrigoni *et al.* (1985) *non* Br.-Bl. *et al.* (1952); *Pistacio-Quercetum ilicis sensu* Arrigoni *et al.* (1990) *non* Brullo & Marcenò 1984.

2a. *quercetosum ilicis* subass. nova hoc loco (holotypus rel. n. 3, Tab. 2), Tab. 2, rel. 1-16.

2b. *chamaeropetosum humilis* subass. nova hoc loco (holotypus rel. n. 1 of Tab. 62 in Biondi, Filigheddu & Farris, 2001, reported in Tab. 2, rel. n. 23 of the present study), Tab. 2, rel. 17-25.
PSEUDONYMS: *Pistacio-Quercetum ilicis sensu* Biondi *et al.* (2001) *non* Brullo & Marcenò (1984).

2c. *phillyreetosum angustifoliae* subass. nova hoc loco (holotypus rel. n. 28, Tab. 2), Tab. 2, rel. 26-34.
PSEUDONYMS: *Erico-Quercetum ilicis sensu* Biondi *et al.* (2001) *non* Brullo *et al.* (1977).

2d. *quercetosum virgilianae* subass. nova hoc loco (holotypus rel. n. 40, Tab. 2), Tab. 2, rel. 35-44.

The thermomediterranean and lower meso-mediterranean climatophilous holm-oak woods of Sardinia, can be referred to this association. These woods were previously attributed to the associations *Erico-Quercetum ilicis* Brullo *et al.* 1977 on

Tab. 2 - *Prasio majoris-Quercetum ilicis* ass. nova (holotypus ril. n. 3)
quercetosum ilicis subass. nova (holotypus ril. n. 3)
chamaeropetosum humilis subass. nova (typus ril. n. 23 = ril. n. 1, Tab. 62 in Biondi *et al* ., 2001)
phillyreetosum angustifoliae subass. nova (holotypus ril. n. 28)
quercetosum virgilianae subass. nova (holotypus ril. n. 40)

	Rel. n.	1	2	3*	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23*	24	25	26	27	28*	29	30	31	32	33	34	35	36	37	38	39	40*	41	42	43	44	P
	Altitude (m slm)	100	100	100	100	80	60	75	220	75	130	90	130	340	100	165	160	50	40	100	50	30	30	50	50	50	150	150	160	50	100	20	50	100	150	250	400	100	100	200	200	200	ND	ND	ND	r
	Exposure	N	N	N	N	ENE	NNE	N	N	WNW	NNE	ENE	N	NE	NNW	WNW	ENE	ENE	NNE	NNE	NNW	0	0	0	SSW	NNE	NNE	E	E	N	0	NE	SW	N	NW	W	NE	NW	ENE	ENE	N	NE	0	ND	ND	ND	e
	Slope (°)	20	20	25	25	10	25	30	45	30	25	20	25	30	30	20	35	ND	ND	20	0	0	0	ND	ND	ND	30	30	20	0	ND	8	10	10	10	20	25	30	30	10	5	0	25	25	20	s.
	Substratum (And=Andesite; Are=Arenaceous; Arg=Clay; Cal=Calcareous; Gra =Granite; Met=Metamorphic; Mets=Metasiltstone; Rio=Rhyolite)	Cal	Cal	Cal	Cal	Cal	Met	Met	Mets	Cal	Cal	Cal	Met	Met.	Met	Met	Met	Cal	Cal	Rio	Arg	Are	Are	Cal	Cal	Cal	Met.	Met.	Gra	Arg	Met.	Gra	Gra	Gra	Gra	And	And	Cal	Cal	Cal	Cal	Cal	Cal	Cal	
	Stone percentage (%)	40	>50	40	40	ND	40	40	30	50	60	20	20	20	30	20	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	<20	<20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
	Area (m²)	100	200	100	100	50	50	200	200	200	100	200	50	100	200	200	100	100	80	100	50	80	80	50	50	80	150	150	100	50	100	100	100	140	115	100	100	100	200	200	100	50	20	100	30	
	Coverage (%)	100	95	90	90	100	90	90	100	80	100	100	100	90	100	90	90	100	100	100	90	100	100	90	100	100	90	90	100	100	100	100	100	100	100	95	100	100	100	100	100	100	100	100	100	
	Average vegetation height (m)	6	8	6	6	5	7	8	9	5	6	8	10	10	10	7	10	8	8	5	5	8	8	4	4	6	12	12	ND	5	9	ND	ND	ND	ND	10	8	6	8	12	10	12	ND	ND	ND	
	Charact. and diff. taxa of the ass.																																													
P scap	*Quercus ilex* L.	4	4	4	4	4	4	4	5	4	5	5	5	4	5	4	4	4	4	4	4	4	4	5	5	5	4	4	5	4	5	5	4	5	4	4	3	4	4	4	4	4	4	5	4	44
P caesp	*Pistacia lentiscus* L.	2	1	1	2	1	1	1	2	2	3	3	+	1	+	+	1	+	1	3	2	3	3	2	2	3	+	1	1	1	2	+	+	1	+	1	1	+	1	1	.	1	1	1	1	43
G rhiz	*Arisarum vulgare* Targ.-Tozz.	1	1	1	.	.	+	+	2	1	+	+	+	+	+	.	+	2	1	2	2	2	2	1	+	1	1	1	1	.	.	.	.	.	.	.	.	+	1	1	+	1	.	.	+	31
P caesp	*Rhamnus alaternus* L.	+	+	1	1	.	+	1	+	.	.	+	.	.	.	.	.	1	1	.	.	+	+	.	.	.	.	.	.	+	.	.	.	.	.	+	+	.	1	+	2	1	1	.	.	1	21
Ch frut	*Prasium majus* L.	+	1	+	1	.	.	.	+	1	1	.	+	.	.	.	.	+	.	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	13
P scap	*Juniperus turbinata* Guss.	.	.	.	.	.	+	.	.	+	+	+	.	.	.	.	.	.	.	.	.	+	+	1	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9
P caesp	*Olea europaea* L. var. *sylvestris* Brot.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	6
P caesp	*Juniperus oxycedrus* L. ssp. *oxycedrus*	.	.	.	.	.	.	+	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Diff. taxa of the *chamaeropetosum humilis* subass.																																												
NP	*Chamaerops humilis* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	1	+	+	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9
	Diff. taxa of the *phillyreetosum angustifoliae* subass.																																												
P caesp	*Phillyrea angustifolia* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	7
P caesp	*Myrtus communis* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	+	1	2	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7
P scap	*Quercus suber* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	5
	Diff. taxa of the *quercetosum virgilianae* subass.																																												
P caesp	*Quercus virgiliana* (Ten.) Ten.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	1	2	1	1	1	+	2	10
NP	*Rosa sempervirens* L.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	1	2	1	2	2	1	.	.	+	10
P lian	*Hedera helix* L. ssp. *helix*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	2	2	1	1	2	7
G bulb	*Allium triquetrum* L.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	1	.	+	+	2	2	.	.	+	11
P lian	*Clematis vitalba* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	+	.	.	.	+	4
G rhiz	*Arum italicum* Mill.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	.	+	4
P caesp	*Crataegus monogyna* Jacq.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	+	.	.	.	.	3
	Charact. and diff. taxa of the *Clematido cirrhosae-Quercenion ilicis* suball. and of the *Fraxino orni-Quercion ilicis* all.																																												
G rad	*Tamus communis* L.	1	1	+	1	1	1	+	+	.	1	+	+	+	2	+	.	+	1	1	1	1	1	1	1	1	1	1	1	+	.	.	.	.	.	1	2	+	1	1	1	1	.	.	1	35
G bulb	*Cyclamen repandum* Sibth. *et* Sm.	2	2	2	2	2	1	1	2	2	1	1	2	2	2	2	2	.	.	.	.	+	.	.	.	1	.	.	.	.	.	.	.	.	.	3	1	.	3	.	.	.	.	.	.	21
P lian	*Clematis cirrhosa* L.	1	2	1	1	1	1	1	1	.	.	.	+	+	+	.	.	+	+	+	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15
G rhiz	*Arum pictum* L. *fil.* ssp. *pictum*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	1	.	+	.	.	1	1	2	1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	9
NP	*Cistus creticus* L. ssp. *eriocephalus* (Viv.) Greuter *et* Burdet	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	+	+	.	4
P scap	*Fraxinus ornus* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	2
H scap	*Galium scabrum* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Charact. and diff. taxa of the upper units																																												
P lian	*Rubia peregrina* L.	+	+	+	1	+	1	1	1	1	+	1	1	1	+	+	+	+	1	1	+	+	+	+	+	+	1	+	.	+	1	.	.	.	+	+	1	1	1	+	2	1	+	+	+	40
NP	*Smilax aspera* L.	+	+	+	+	.	.	+	2	+	2	2	1	1	2	.	.	1	2	1	.	+	+	2	1	.	+	+	.	.	.	+	+	+	1	+	+	1	2	1	2	2	2	2	+	35
G rhiz	*Asparagus acutifolius* L.	+	+	+	+	.	1	+	1	+	+	1	+	.	+	.	.	1	1	1	1	1	1	+	+	1	.	.	.	+	.	+	.	.	1	1	1	1	1	2	1	+	+	+	33
P caesp	*Arbutus unedo* L.	1	1	1	1	.	+	+	.	.	.	.	2	2	1	2	.	.	+	.	.	1	.	2	2	2	2	1	2	2	2	2	1	1	2	+	1	.	.	2	.	.	1	1	.	29
H caesp	*Carex distachya* Desf.	+	+	+	+	1	1	1	+	.	.	+	+	+	.	.	1	1	2	.	+	.	.	1	+	+	1	+	1	1	.	.	.	+	.	.	.	.	1	1	.	1	.	.	.	26
P lian	*Lonicera implexa* Aiton	1	1	1	1	+	+	2	+	.	+	+	.	.	1	+	+	.	+	+	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	+	.	2	2	2	1	1	1	+	.	.	25
G rhiz	*Ruscus aculeatus* L.	+	+	+	+	2	+	+	2	.	.	.	.	.	+	.	+	1	+	+	.	.	.	.	.	.	.	.	+	2	.	.	.	.	1	.	+	+	+	1	1	+	+	+	24
P caesp	*Phillyrea latifolia* L.	2	2	2	1	1	1	1	1	+	1	1	1	1	+	+	1	.	+	.	+	.	.	1	.	1	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	22
P caesp	*Erica arborea* L.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	1	+	.	.	.	+	.	.	.	.	.	.	1	2	1	1	1	3	2	2	2	2	2	2	.	.	.	.	.	.	.	17
H ros	*Asplenium onopteris* L.	.	.	.	.	.	1	1	2	.	.	.	2	1	1	.	1	+	+	.	.	.	.	.	+	.	.	.	+	+	1	.	.	.	.	1	+	.	+	.	.	.	.	.	.	16
P caesp	*Viburnum tinus* L.	.	.	.	.	.	.	.	.	.	.	.	1	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	3	3	2	2	2	1	13
H scap	*Pulicaria odora* (L.) Rchb.	.	.	.	.	.	+	.	+	.	.	+	+	.	.	+	+	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	11
NP	*Osyris alba* L.	.	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	.	1	+	.	.	1	10
Ch rept	*Selaginella denticulata* (L.) Link	.	.	.	.	.	.	+	+	2	+	+	.	1	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	9
NP	*Euphorbia characias* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
H caesp	*Stipa bromoides* (L.) Dorfl.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	5
H caesp	*Carex hallerana* Asso	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
P lian	*Clematis flammula* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
P caesp	*Laurus nobilis* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	2
P caesp	*Anagyris foetida* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1
P caesp	*Calicotome spinosa* (L.) Link	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
P caesp	*Calicotome villosa* (Poiret) Link	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
NP	*Euphorbia dendroides* L.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Accidental species	3	2	0	1	0	0	1	1	2	3	7	1	1	0	1	1	0	1	1	0	2	2	7	5	3	3	1	4	2	2	1	0	1	2	6	6	0	5	3	2	4	4	2	6	

metamorphic substrata (Biondi *et al*., 2001) or to *Pistacio-Quercetum ilicis* Brullo & Marcenò 1984 on limestones (Arrigoni *et al*., 1990; Biondi *et al*., 2001). The creation of a Sardinian-Corsican thermophylous association of *Q. ilex* has been hypothesised previously (Biondi *et al*., 1997; Gamisans, 1991) but has never been formalised.

The typical subassociation *quercetosum ilicis* includes the calcicole, lower mesomediterranean dry-subhumid, climatophilous holm-oak woods (variant with *Rhamnus alaternus*), and those silicicole on the granites, metamorphic rocks and rhyolites, and sometimes on the red soils lacking in carbonates (variant with *Erica arborea*). This subassociation is found at altitude between 60 and 340 m on the southern sides of internal Nurra, Logudoro, Montiferru and Sulcis.

The subassociation *chamaeropetosum humilis* includes the calcicole, thermomediterranean, dry, climatophilous holm-oak woods, at altitude between 30 and 100 m, on north-eastern sides of the Mesozoic limestones of Nurra (Tab. 63 in Biondi *et al*., 2001) and sometimes on volcanic and arenaceous substrata.

The subassociation *phillyreetosum angustifoliae* includes the thermophylous climatophilous holm-oak woods on the metamorphic and granite substrata of northern Sardinia (coastal Gallura and Nurra) at altitude between 20 and 160 m.

Finally, the subassociation *quercetosum virgilianae* represents the most mesophilous aspect of the association, which includes the calcicole, lower mesomediterranean, lower subhumid, climatophilous holm-oak woods at altitude between 100 and 400 m on sides exposed to the north and north-east, on the Oligo-Miocenic andesites and the Miocenic marls and limestones of Sassarese, Logudoro and Mejlogu subregions in the north, and Marmilla and Trexenta subregions in the south.

With respect to the other Sardinian associations, *Prasio majoris-Quercetum ilicis* is differentiated by the presence of taxa of the *Pistacio-Rhamnetalia alaterni* order, such as: *Pistacia lentiscus*, *Rhamnus alaternus*, *Prasium majus*, *Arum pictum* ssp. *pictum*, *Arisarum vulgare*, *Olea europaea* var. *sylvestris*, *Juniperus turbinata* and *J. oxycedrus* ssp. *oxycedrus.*

3. *GALIO SCABRI-QUERCETUM ILICIS* Gamisans (1977) 1986 (typus rel. n. 12 of Tab. 46 in Gamisans, 1977), Tab. 3, rel. 1-19, Fig. 3.
Synonyms: *Allio triquetri-Quercetum ilicis* Ubaldi 2003 (syntaxonomic synonym).
Pseudonyms: *Viburno-Quercetum ilicis sensu* Arrigoni *et al*. (1985, 1990, 1996a) *non* (Br.-Bl.) Rivas-Martínez 1975; *Viburno-Quercetum ilicis sensu* Mossa (1985) and Camarda *et al*. (1995) *non* (Br.-Bl.) Rivas-Martínez 1975; *Asplenio-Quercetum ilicis sensu* Camarda *et al*. (1995) *non* Rivas-Martínez 1975; *Asplenio onopteris-Quercetum ilicis sensu* Arrigoni *et al*. (1996b) *non* Rivas-Martínez 1975.

3a. *ilicetosum aquifolii* subass. nova hoc loco (holotypus rel. n. 5, Tab. 3), Tab. 3, rel. 1-5.

3b. *clematidetosum cirrhosae* (Ubaldi 2003) comb. et stat. nov. prop. [typus rel. n. 123 of Tab. 2 in Arrigoni *et al*., 1985 (Art. 18c, Art. 27c), not included in the present study], Tab. 3, rel. 6-15.
Synonyms: *Clematido cirrhosae-Quercetum ilicis* Ubaldi 2003 (syntaxonomic synonym); *Clematido cirrhosae-Quercetum ilicis* Rivas-Martínez, Biondi, Costa & Mossa 2003 (Art. 6).

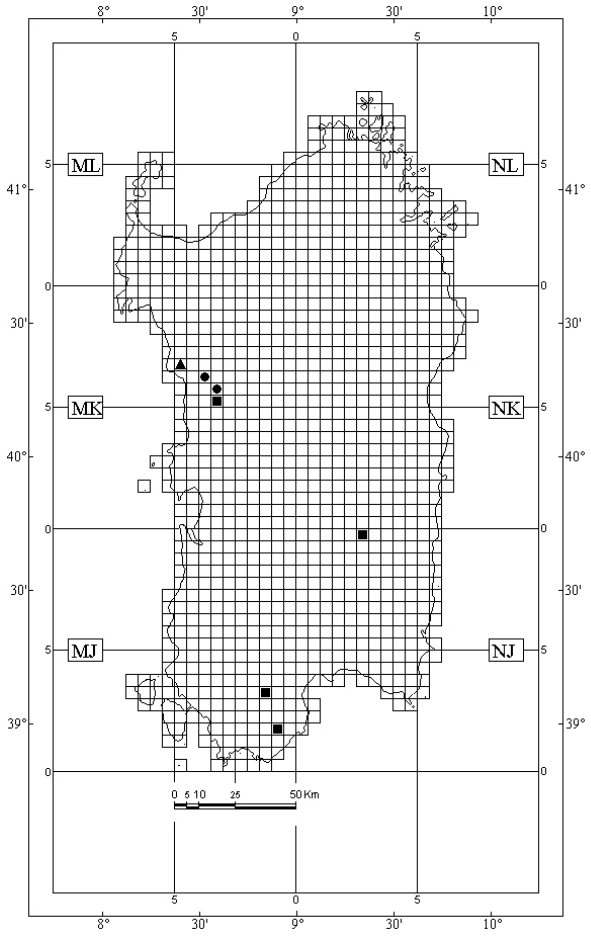

Fig. 3 - Relevées location of the ass. *Galio scabri-Quercetum ilicis* (*ilicetosum aquifolii* subass. nova = ●; *clematidetosum cirrhosae* = ■; *polypodietosum serrulati* subass. nova = ▲)

Tab. 3 - *Galio scabri-Quercetum ilicis* Gamisans (1977) 1986
ilicetosum aquifolii subass. nova (holotypus ril. n. 5)
clematidetosum cirrhosae (Ubaldi 2003) comb. et stat. nov.
polypodietosum serrulati subass. nova (holotypus ril. n. 16)

	Rel. n.	1	2	3	4	5*	6	7	8	9	10	11	12	13	14	15	16*	17	18	19	P
	Altitude (m slm)	750	600	700	770	700	700	750	790	845	865	600	600	760	720	580	750	750	750	750	r
	Exposure	WNW	NNW	NW	W	WNW	NE	SW	NW	NE	NNE	NW	NW	E	NW	ENE	NE	NE	NE	NE	e
	Slope (°)	5	10	5	25	5	25	20	20	30	30	10	15	20	25	15	10	10	10	10	s.
	Substratum (Bas=Basalt; Gra =Granite; Met=Metamorphic; Rio=Rhyolite)	Bas	Rio	Bas	Rio	Bas	Met	Met	Met	Gra	Gra	Rio	Rio	Met	Gra	Met	Rio	Rio	Rio	Rio	
	Stone percentage (%)	ND	30	5	ND	ND	ND	ND	ND	60	50	10	10	20	40	10	50	50	50	50	
	Area (m^2)	50	100	100	200	100	200	200	200	70	100	100	100	200	30	200	100	100	100	100	
	Coverage (%)	100	100	100	95	100	100	100	100	100	90	100	100	100	100	100	100	100	100	100	
	Average vegetation height (m)	12	8	8	12	12	8	9	8	10	14	6	8	18	6	10	8	8	8	8	
	Charact. and diff. taxa of the ass.																				
P scap	*Quercus ilex* L.	5	3	4	5	4	3	4	4	4	5	3	3	5	4	4	4	4	4	4	19
P lian	*Hedera helix* L. ssp. *helix*	+	1	1	1	1	+	.	+	+	.	1	1	+	+	.	+	+	+	1	16
H scap	*Galium scabrum* L.	+	1	1	+	1	1	1	+	.	+	1	1	+	.	+	.	.	.	.	13
H caesp	*Luzula forsteri* (Sm.) DC.	.	.	+	2	1	.	.	.	.	.	+	.	+	.	+	.	.	.	.	6
	Diff. taxa of the *ilicetosum aquifolii* subass.																				
P caesp	*Ilex aquifolium* L.	2	1	1	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
H scap	*Sanicula europaea* L.	1	.	+	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
H ros	*Viola alba* Besser ssp. *dehnhardtii* (Ten.) W. Becker	+	.	.	1	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	4
G rhiz	*Pteridium aquilinum* (L.) Kuhn	+	.	.	1	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	4
H caesp	*Brachypodium sylvaticum* (Hudson) Beauv.	.	.	+	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Diff. taxa of the *clematidetosum cirrhosae* subass.																				
P caesp	*Phillyrea latifolia* L.	.	.	.	.	+	1	1	+	2	2	1	1	1	2	1	.	.	.	.	11
P lian	*Clematis cirrhosa* L.	.	.	.	.	.	+	.	.	+	+	.	.	+	+	+	.	.	.	.	6
	Diff. taxa of the *polypodietosum serrulati* subass.																				
P caesp	*Quercus ichnusae* Mossa, Bacchetta *et* Brullo	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	5
H ros	*Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcangeli) Pic. Ser.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	+	4
	Charact. and diff. taxa of the *Clematido cirrhosae-Quercenion ilicis* suball. and of the *Fraxino orni-Quercion ilicis* all.																				
G bulb	*Cyclamen repandum* Sibth. *et* Sm.	2	1	2	2	2	1	1	1	2	+	2	2	1	2	2	2	1	2	2	19
G rad	*Tamus communis* L.	.	.	+	.	.	+	.	.	.	.	.	+	.	.	.	+	+	+	+	7
G rhiz	*Paeonia morisii* Cesca, Bernardo *et* Passalacqua	+	.	.	.	.	+	+	1	.	.	.	.	.	.	.	.	+	.	1	6
P caesp	*Ostrya carpinifolia* Scop.	.	.	.	.	.	+	1	+	.	.	.	.	.	.	.	.	.	.	.	3
H scap	*Teucrium scorodonia* L.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
H scap	*Digitalis purpurea* L. var. *gyspergerae* (Rouy) Fiori	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Charact. and diff. taxa of the upper units																				
H ros	*Asplenium onopteris* L.	+	+	2	+	+	+	.	.	1	+	1	1	1	1	.	1	1	1	1	16
P caesp	*Arbutus unedo* L.	1	2	1	2	2	3	3	3	3	3	2	2	2	1	2	.	.	.	.	15
P caesp	*Erica arborea* L.	.	+	+	1	1	1	1	1	.	.	1	1	+	2	+	.	.	.	.	12
G rhiz	*Ruscus aculeatus* L.	+	.	+	+	+	.	.	.	+	.	+	+	.	.	1	+	+	1	1	12
P lian	*Rubia peregrina* L.	.	.	+	+	+	+	1	+	.	.	+	+	.	.	.	+	+	+	.	11
NP	*Smilax aspera* L.	+	1	+	+	1	+	+	+	.	.	+	.	.	.	1	.	.	.	.	10
H caesp	*Carex distachya* Desf.	.	.	2	+	.	.	.	.	.	.	+	.	+	1	+	.	.	.	.	6
NP	*Rosa sempervirens* L.	.	.	+	+	.	+	+	.	.	.	+	.	.	.	.	.	.	+	.	6
H caesp	*Stipa bromoides* (L.) Dorfl.	.	.	.	1	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2
G rhiz	*Asparagus acutifolius* L.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	2
NP	*Euphorbia characias* L.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	2
H scap	*Pulicaria odora* (L.) Rchb.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	2
P lian	*Lonicera implexa* Aiton	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1
G rhiz	*Limodorum trabutianum* Batt.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1
Ch rept	*Selaginella denticulata* (L.) Link	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1
	Other species																				
P caesp	*Crataegus monogyna* Jacq.	.	+	1	1	1	1	.	.	.	.	+	+	.	.	.	.	.	+	1	9
NP	*Rubus* gr. *ulmifolius* Schott	+	1	1	+	1	.	+	1	.	.	+	.	.	.	.	.	.	.	.	8
G rhiz	*Polystichum setiferum* (Forssk.) [T. Moore *ex*] Woynar	+	1	.	.	+	.	.	.	.	.	.	.	.	.	.	+	+	1	1	7
P caesp	*Cytisus villosus* Pourr.	.	.	1	+	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	5
	Accidental species	1	1	4	5	2	1	2	0	2	2	0	0	0	2	1	0	0	4	3	

3c. *polypodietosum serrulati* subass. nova hoc loco (holotypus rel. n. 16, Tab. 3), Tab. 3, rel. 16-19.

The holm-oak woods of the upper mesomediterranean-lower supramediterranean belt, with a upper subhumid humid ombrotype, are referred to the association *Galio scabri-Quercetum ilicis* described for Corsica (Gamisans, 1986). These are evergreen mesowoods of holm-oak, with *Erica arborea, Galium scabrum, Arbutus unedo* and *Hedera helix* which grow at altitude between 580 and 1030 m. This association is present in Sardinia with three subassociations. The subassociation *ilicetosum aquifolii* includes the humid edapho-mesophilous holm-oak woods with *Ilex aquifolium*, at altitude between 600 and 800 m, on sides with a western exposure in Montiferru. The subassociation *clematidetosum cirrhosae* includes the climatophilous holm-oak woods on granites, metamorphic rocks, volcanites and Mesozoic limestones of Montiferru, Sulcis and central-eastern Sardinia (to which the typus relevée refers), at altitude between 580 and 870 m. Finally, to the subassociation *polypodietosum serrulati*, the edapho-xerophilous, upper Mesomediterranean holm-oak woods on the Oligo-Miocenic acidic volcanites of Planargia are referred at average altitude of 750 m.

With respect to the association *Prasio majoris-Quercetum ilicis*, the association *Galio scabri-Quercetum ilicis* is differentiated by the almost total absence of entities referable to the *Pistacio-Rhamnetalia alaterni* order, as well as by the higher frequency of: *Galium scabrum, Cyclamen repandum, Hedera helix* and *Luzula forsteri.*

Clematis cirrhosa, Euphorbia characias and *Rosa sempervirens* differentiate the Sardinian climatophilous subassociation *clematidetosum cirrhosae* from the Corsican subassociation *fraxinetosum orni* (Allier & Lacoste, 1980) Gamisans 1986.

4. *SANICULO EUROPAEAE-QUERCETUM ILICIS* ass. nova hoc loco (holotypus rel. n. 8, Tab. 4), Tab. 4, rel. 1-16, Fig. 4.

This association includes the acidophilous mesowoods of *Q. ilex* and *Ilex aquifolium* of the upper mesotemperate-lower supratemperate phytoclimatic belts, with a humid ombrotype, of the metamorphic and volcanic substrata of central-northern Sardinia (Goceano and Montiferru). It is also found in limited areas of southern Sardinia (western Sulcis) on Paleozoic limestone substrata. The association grows at altitude between 660 and 1100 m, on sides with a mainly western exposure.

With respect to the other Sardinian associations here presented, it is differentiated by the presence of mesophilous entities (*Ilex aquifolium, Hedera helix, Crataegus monogyna, Viola alba* ssp. *dehnhardtii, Brachypodium sylvaticum, Sanicula europaea, Luzula forsteri, Quercus ichnusae, Clematis vitalba, Polystichum setiferum, Mycelis muralis, Teucrium scorodonia* and *Helleborus lividus* ssp. *corsicus*) and by the absence or rarity of various entities of the *Quercetea ilicis* class (*Arbutus unedo, Smilax aspera, Asparagus acutifolius, Phillyrea latifolia* and *Lonicera implexa*).

It is differentiated from the calcicole, Supra-mediterranean association *Aceri monspessulani-Quercetum ilicis* by the absence of *Juniperus oxycedrus, Phillyrea latifolia, Paeonia morisii, Epipactis microphylla, E. helleborine, Cephalanthera damasonium, Robertia taraxacoides, Crepis caespitosa*

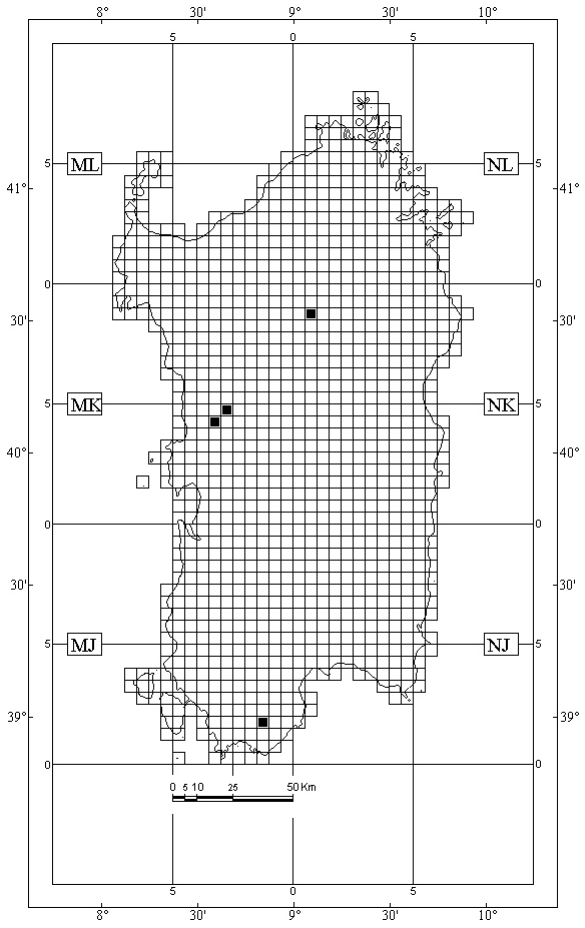

Fig. 4 - Relevées location of the ass. *Saniculo europaeae-Quercetum ilicis* ass. nova = ■

Tab. 4 - *Saniculo europaeae-Quercetum ilicis* ass. nova (holotypus ril. n. 8)

	Rel. n.	1	2	3	4	5	6	7	8*	9	10	11	12	13	14	15	16	P
	Altitude (m slm)	930	1050	1050	950	900	1000	1000	900	1000	800	660	750	750	800	750	1100	r
	Exposure	0	NW	NW	NE	WSW	0	0	NE	SE	NNE	SW	WSW	WSW	WSW	WNW	E	e
	Slope (°)	0	30	30	5	30	0	0	5	10	10	40	5	5	5	5	15	s.
	Substratum (Cal=Calcareous; Met=Metamorphic; Rio=Rhyolite)	Rio	Met	Met	Rio	Rio	Met	Met	Rio	Met	Rio	Cal	Rio	Rio	Rio	Rio	Met	
	Stone percentage (%)	<5	10	10	<5	<5	8	10	<5	8	<5	20	12	15	10	5	10	
	Area (m^2)	100	100	100	100	100	100	100	100	100	200	ND	200	200	200	200	100	
	Coverage (%)	100	90	90	100	80	90	100	90	100	100	ND	100	100	100	90	100	
	Average vegetation height (m)	12	8	8	12	10	8	10	15	8	12	7	10	10	10	15	8	
	Charact. and diff. taxa of the ass.																	
P scap	*Quercus ilex* L.	5	4	5	5	4	4	4	4	5	3	2	5	4	4	4	5	16
P caesp	*Ilex aquifolium* L.	1	2	1	1	2	2	2	2	2	2	3	2	1	1	1	1	16
P caesp	*Crataegus monogyna* Jacq.	2	1	1	+	1	1	1	1	+	1	+	2	3	2	1	2	16
H caesp	*Brachypodium sylvaticum* (Hudson) Beauv.	.	+	1	.	.	1	2	1	1	1	+	1	1	+	+	+	13
H ros	*Viola alba* Besser ssp. *dehnhardtii* (Ten.) W. Becker	+	2	1	.	.	1	+	1	2	2	+	.	.	+	+	1	12
H caesp	*Luzula forsteri* (Sm.) DC.	.	.	.	.	.	.	1	+	1	+	+	1	1	+	1	+	10
H scap	*Sanicula europaea* L.	.	1	2	.	.	2	3	1	+	.	1	.	.	.	2	+	9
P caesp	*Cytisus villosus* Pourr.	.	.	.	.	1	.	.	+	.	+	.	+	+	+	1	.	7
	Charact. and diff. taxa of the *Clematido cirrhosae-Quercenion ilicis* suball. and of the *Fraxino orni-Quercion ilicis* all.																	
H scap	*Galium scabrum* L.	+	.	.	1	+	.	.	1	1	+	+	1	+	+	1	.	11
G bulb	*Cyclamen repandum* Sibth. *et* Sm.	.	.	.	.	.	.	.	2	2	2	1	3	2	2	2	2	9
H scap	*Teucrium scorodonia* L.	.	.	.	+	1	.	.	1	.	1	.	.	.	.	1	.	5
H scap	*Digitalis purpurea* L. var. *gyspergerae* (Rouy) Fiori	.	+	+	+	.	.	.	.	+	+	.	.	.	.	.	.	5
P caesp	*Quercus congesta* C. Presl. *in* J. *et* C. Presl.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.	+	4
G rhiz	*Helleborus lividus* Aiton ssp. *corsicus* (Briq.) P. Fourn.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	+	.	3
G rad	*Tamus communis* L.	.	.	.	.	.	.	.	+	.	+	+	.	.	.	.	.	3
P caesp	*Quercus dalechampii* Ten.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	2
G rhiz	*Paeonia morisii* Cesca, Bernardo *et* Passalacqua	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1
	Charact. and diff. taxa of the upper units																	
P lian	*Rubia peregrina* L.	+	+	+	+	+	1	1	+	+	+	+	+	+	+	+	1	16
H ros	*Asplenium onopteris* L.	+	.	.	+	1	+	.	+	.	1	+	+	1	1	+	.	11
P caesp	*Erica arborea* L.	+	.	.	2	2	.	.	+	.	+	+	.	.	.	+	1	8
G rhiz	*Ruscus aculeatus* L.	+	.	.	+	2	.	.	+	.	.	.	1	1	+	+	.	8
NP	*Rosa sempervirens* L.	.	.	.	+	+	.	.	+	.	2	.	+	1	+	.	.	7
H caesp	*Carex distachya* Desf.	.	.	.	.	.	+	+	.	1	.	+	2	2	2	.	.	7
NP	*Smilax aspera* L.	.	.	.	.	.	.	.	.	.	.	+	+	1	+	+	.	5
P caesp	*Arbutus unedo* L.	+	.	.	+	.	.	.	.	.	.	+	.	.	.	1	.	4
NP	*Euphorbia characias* L.	.	.	.	.	.	.	.	.	.	.	.	+	1	+	.	.	3
H caesp	*Stipa bromoides* (L.) Dorfl.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	2
G rhiz	*Asparagus acutifolius* L.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	2
P caesp	*Phillyrea latifolia* L.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1
	Charact. and diff. taxa of the *Querco-Fagetea* class																	
P lian	*Hedera helix* L. ssp. *helix*	1	1	1	1	1	1	1	1	+	2	1	2	2	2	2	1	16
P lian	*Clematis vitalba* L.	.	.	.	.	.	.	.	1	.	1	+	1	1	3	3	.	7
H scap	*Mycelis muralis* (L.) Dumort.	.	.	+	.	.	1	1	+	.	.	+	.	.	.	.	+	6
P caesp	*Quercus ichnusae* Mossa, Bacchetta *et* Brullo	+	.	.	+	1	.	.	1	.	1	.	.	.	.	.	.	5
G rhiz	*Polystichum setiferum* (Forssk.) [T. Moore *ex*] Woynar	.	r	1	.	.	.	.	+	.	.	+	.	.	.	.	+	5
H scap	*Oenanthe pimpinelloides* L.	.	.	+	.	.	+	1	.	+	.	.	.	.	.	.	1	5
P scap	*Prunus avium* L.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	+	.	3
P scap	*Castanea sativa* Mill.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	2
H rept	*Fragaria vesca* L.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	2
H scap	*Geum urbanum* L.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	2
H caesp	*Poa nemoralis* L.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	2
P scap	*Pyrus pyraster* Burgsd.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	2
P lian	*Vitis vinifera* L. ssp. *sylvestris* (Gmelin) Hegi	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	1
G rhiz	*Cephalanthera longifolia* (Hudson) Fritsch	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1
H scap	*Epilobium montanum* Boiss.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1
Ch suffr	*Euphorbia amygdaloides* L. ssp. *arbuscula* Meusel	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1
P caesp	*Acer monspessulanum* L.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1
P scap	*Taxus baccata* L.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1
G rhiz	*Iris foetidissima* L.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1
	Other species																	
G rhiz	*Pteridium aquilinum* (L.) Kuhn	2	2	1	1	+	+	1	2	2	2	1	1	2	2	2	2	16
NP	*Rubus* gr. *ulmifolius* Schott	2	2	1	2	+	1	1	2	2	2	2	+	1	1	+	1	16
H caesp	*Carex divulsa* Stockes	.	1	+	.	.	1	1	.	.	1	.	.	.	.	.	1	6
NP	*Rosa canina* L.	+	.	+	.	.	.	+	+	.	1	.	.	.	.	.	+	6
H scap	*Satureja vulgaris* (L.) Fritsch ssp. *orientalis* (Bothmer) Greuter *et*	.	.	.	.	.	1	1	.	+	+	.	.	.	.	.	.	4
	Accidental species	0	0	1	1	0	1	1	1	0	3	2	1	1	0	0	2	

and *Rosa pouzinii* and by the presence of *Ilex aquifolium*, *Crataegus monogyna*, *Sanicula europaea*, *Quercus ichnusae*, *Clematis vitalba*, *Polystichum setiferum*, *Mycelis muralis* and *Teucrium scorodonia*.

With respect to the acidophilous, supramediterranean association *Ilici-Quercetum ilicis* Gamisans (1975) 1977 of Corsica, which is found at altitude between 800 and 1000 m and is included in the *Fagetalia sylvaticae* order (Gamisans, 1986), the association *Saniculo europaeae-Quercetum ilicis* is differentiated by the absence of *Festuca heterophylla*, *Cyclamen hederifolium*, *Fraxinus ornus*, *Galium rotundifolium*, *Moehringia trinervia*, *Veronica officinalis*, *Fagus sylvatica* and *Daphne laureola* and by the presence of *Viola alba* ssp. *dehnhardtii*, *Brachypodium sylvaticum*, *Galium scabrum*, *Rosa sempervirens* and *Carex distachya*. The Sardinian association is clearly included in the order *Quercetalia ilicis*. This holm-oak wood falls into a group of euoceanic, Tyrrhenian-montane associations with great phytoclimatic and phytogeographic significance,

which, as well as the association *Ilici-Quercetum ilicis*, also includes the calcicole *Aceri monspessulani-Quercetum ilicis* of the limestones of central-eastern Sardinia (Arrigoni *et al*., 1990) and *Aceri campestris-Quercetum ilicis* Brullo 1984 of the limestone sectors of Madonie in Sicily (Brullo, 1984).

5. *ACERI MONSPESSULANI-QUERCETUM ILICIS* Arrigoni, Di Tommaso & Mele 1985 (typus rel. n. 6 of Tab. 3 in Arrigoni, Di Tommaso & Mele, 1985), Tab. 5, rel. 1-4, Fig. 5.

5a. *aceretosum monspessulani* subass. nova hoc loco (typus rel. n. 6 of Tab. 3 in Arrigoni, Di Tommaso & Mele, 1985).

5b. *arbutetosum unedonis* subass. nova hoc loco (holotypus rel. n. 2, Tab. 5).

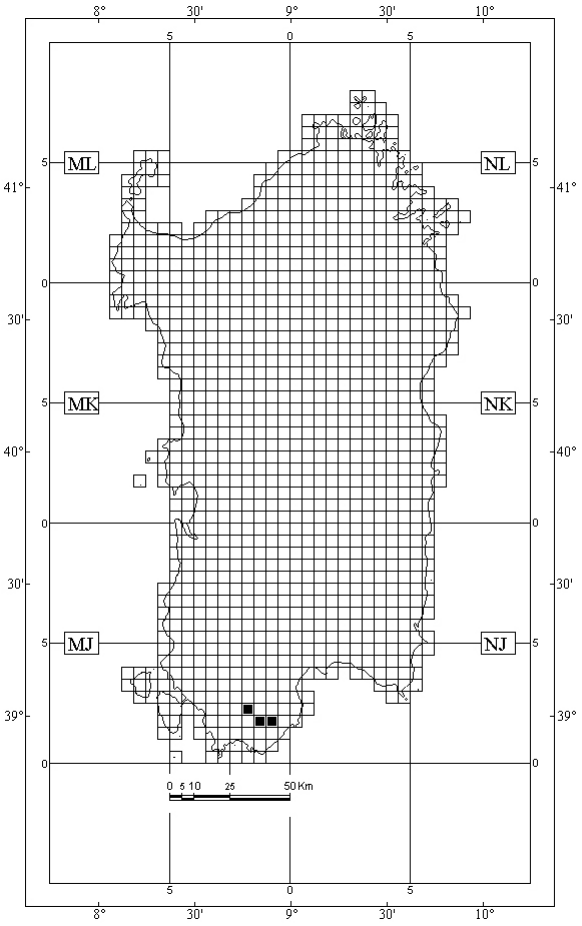

Fig. 5 - Relevées location of the subass. *Aceri monspessulani-Quercetum ilicis arbutetosum unedonis* subass. nova = ■

To this association are referred the upper mesomediterranean-lower supramediterranean, upper subhumid-humid, calcicole holm-oak woods of the limestone substrata of central-eastern and southern Sardinia. The present contribution enlarges the distribution of the association, already described for the central-eastern limestones of Sardinia (Arrigoni *et al*., 1985; 1990), to Sulcis (south-western Sardinia). As with the preceeding association, it falls in a group of euoceanic, Tyrrhenian-montane associations.

With respect to the other Sardinian associations, the characteristic and differential entities are considered to be: *Paeonia morisii*, *Cephalanthera damasonium*, *Epipactis microphylla* and *E. helleborine*.

The typical subassociation *aceretosum monspessulani* of the central-eastern Mesozoic limestones includes mature mesowoods some of which have never suffered interventions by man, such as cutting or burning, with trees of more than 500 years of age and therefore of enormous historic and conservational value (Susmel *et al*., 1976).

The subassociation *arbutetosum unedonis* of the Paleozoic limestones of south-western Sardinia is differentiated by a greater presence of silicicole entities (*Arbutus unedo, Erica arborea, Limodorum abortivum* and *Selaginella denticulata*) due to the strong decarbonatation of the Paleozoic limestones of Sulcis, and by an exclusively upper mesomediterranean bioclimatic collocation as they are found at altitude between 530 and 920 m.

The cork-oak woods

Regarding instead the forest vegetation of *Q. suber*, Sardinia alone has 90% of the national coverage of these woods, with 90,516 ha quantified in 1985 (Corona *et al*., 1989). *Q. suber* was often considered as a more xerophilous and thermophylous species than *Q. ilex* (Giacomini & Fenaroli, 1958) and the cork-oak woods as transitory and sometimes not dynamic degradation stages of ancient holm-oak woods (Arrigoni *et al*., 1996; Bellot-Rodriguez, 1945; Braun-Blanquet, 1936, 1952a; Lapraz, 1962; Molinier, 1968, 1973; Molinier *et al*., 1959; Mossa, 1985; Pignatti, 1998; Rivas-Goday *et al*., 1959; Valsecchi, 1977; Zeller, 1957, 1959). However, few investigations have supported the hypothesis that considers the cork-oak woods as vegetation typologies of potential value on the non-carbonaceous substrata (Dupias, 1963; Loisel, 1971; Sauvage, 1961). As a consequence of this interpretation, the Sardinian cork-

Tab. 5 - *Aceri monspessulani-Quercetum ilicis* Arrigoni, Di Tommaso & Mele 1985 *arbutetosum unedonis* subass. nova (holotypus ril. n. 2)

	Rel. n.	1	2*	3	4	P
	Altitude (m slm)	920	780	530	660	r
	Exposure	N	SSE	WNW	NE	e
	Slope (°)	15	15	30	25	s.
	Substratum (Cal=Calcareous)	Cal	Cal	Cal	Cal	
	Stone percentage (%)	40	30	30	10	
	Area (m^2)	200	200	200	100	
	Coverage (%)	100	100	100	100	
	Average vegetation height (m)	16	12	10	12	
	Charact. and diff. taxa of the ass.					
P scap	*Quercus ilex* L.	5	5	5	5	4
G rhiz	*Epipactis microphylla* (Ehrh.) Swartz	1	1	1	2	4
G rhiz	*Paeonia morisii* Cesca, Bernardo *et* Passalacqua	2	+	1	1	4
G rhiz	*Epipactis helleborine* (L.) Crantz	+	+	.	.	2
	Diff. taxa of the *arbutetosum unedonis* subass.					
P caesp	*Arbutus unedo* L.	1	1	1	+	4
G rhiz	*Pteridium aquilinum* (L.) Kuhn	+	+	.	+	3
P caesp	*Erica arborea* L.	.	+	.	1	2
H scap	*Digitalis purpurea* L. var. *gyspergerae* (Rouy) Fiori	+	+	.	.	2
G rhiz	*Limodorum abortivum* (L.) Swartz	+	+	.	.	2
	Charact. and diff. taxa of the *Clematido cirrhosae-Quercenion ilicis* suball. and of the *Fraxino orni-Quercion ilicis* all.					
G bulb	*Cyclamen repandum* Sibth. *et* Sm.	1	1	1	1	4
H scap	*Galium scabrum* L.	+	1	.	+	3
G rad	*Tamus communis* L.	+	+	.	.	2
	Charact. and diff. taxa of the upper units					
P lian	*Smilax aspera* L.	+	1	2	1	4
P lian	*Rubia peregrina* L.	+	1	+	+	4
H caesp	*Carex distachya* Desf.	+	+	.	+	3
G rhiz	*Asparagus acutifolius* L.	+	.	+	+	3
H ros	*Asplenium onopteris* L.	.	1	.	+	2
P scap	*Phillyrea latifolia* L.	.	+	1	.	2
Ch rept	*Selaginella denticulata* (L.) Spring	.	.	.	+	1
	Charact. and diff. taxa of the *Querco-Fagetea* class					
P lian	*Hedera helix* L. ssp. *helix*	+	1	+	1	4
H ros	*Viola alba* Besser ssp. *dehnhardtii* (Ten.) W. Becker	+	+	1	+	4
P caesp	*Crataegus monogyna* Jacq.	+	+	.	2	3
H caesp	*Luzula forsteri* (Sm.) DC.	+	+	.	+	3
G rhiz	*Cephalanthera longifolia* (L.) Fritsch	1	.	.	+	2
H scap	*Epilobium montanum* Boiss.	+	+	.	.	2
H caesp	*Brachypodium sylvaticum* (Hudson) P. Beauv.	+	.	.	+	2
H ros	*Sanicula europaea* L.	+	.	+	.	2
P lian	*Clematis vitalba* L.	.	+	+	.	2
H scap	*Viola riviniana* Reichb.	1	.	.	.	1
H scap	*Prunella vulgaris* L.	.	.	+	.	1
	Other species					
NP	*Rubus ulmifolius* Schott	+	+	.	1	3
Ch suffr	*Teucrium massiliense* L.	+	+	.	.	2
G rhiz	*Dryopteris tyrrhena* Fraser-Jenkins *et* Reichsten	.	+	.	.	1
NP	*Hypericum hircinum* L. ssp. *hircinum*	.	.	.	+	1

oak woods have not been recognised as autonomous syntaxonomic entities and therefore they have mainly been considered as subassociations or variants of holm-oak woods (Chiappini & Palmas, 1972; Mossa, 1985, 1987; Camarda *et al*., 1995; Arrigoni *et al*., 1996).

Only recently Serra *et al*. (2002) and Rivas-Martínez *et al*. (2003) have recognised for Sardinia, within the alliance *Quercion ilicis* (suballiance *Quercenion ilicis*), the presence of autonomous associations of *Q. suber*. In the latter study, in particular, the association *Galio scabri-Quercetum suberis* was proposed, which groups together the Sardinian Mesomediterranean, subhumid Cork-oak woods, on soils with sandy texture and of granite origin (*saboulon*). The same association was included in the alliance *Fraxino orni-Quercion ilicis* by Biondi *et al*. (2003)

Results and Discussion

The elaboration of the relevées has allowed to recognise the associations *Galio scabri-Quercetum suberis* and *Violo dehnhardtii-Quercetum suberis* ass. nova.

1. *GALIO SCABRI-QUERCETUM SUBERIS* Rivas-Martínez, Biondi, Costa & Mossa 2003 (typus rel. n. 2 of Tab. 2 in Rivas-Martínez, Biondi, Costa & Mossa, 2003), Tab. 6, rel. 1-15, Fig. 6.

1a. *quercetosum suberis* Rivas-Martínez, Biondi, Costa & Mossa 2003 (typus rel. n. 2 of Tab. 2 in Rivas-Martínez, Biondi, Costa & Mossa, 2003), Tab. 6, rel. 1-10.

1b. *rhamnetosum alaterni* subass. nova hoc loco (holotypus rel. n. 14, Tab. 6), Tab. 6, rel. 11-15.

To this association are ascribed the acidophilous, Mesomediterranean, subhumid mesowoods of Cork-oak that are found on granites and metamorphic substrata, at altitude between 200 and 550 m. Throughout Sardinia this vegetation is subjected to intense usage for the extraction of cork or as wooded pasture (*dehesa* landscape).

The typical subassociation *quercetosum suberis*, described for Gallura and here reported for Sulcis and Sarrabus (southern Sardinia), prefers the granite substrata (*saboulon*), where it grows in the Mesomediterranean, subhumid phytoclimatic belt, at altitude between 200 and 420 m with a mainly south-eastern exposure and it can also penetrate the upper thermomediterranean, upper dry belt, in ecological conditions of edaphic compensation.

The subassociation *rhamnetosum alaterni* is instead found on the metamorphic substrata of Iglesiente, at altitude between 320 and 550 m, often on eastern exposures.

With respect to the association *Violo dehnhardtii-Quercetum suberis*, the differential species of this association are: *Galium scabrum*, *Cyclamen repandum* and *Ruscus aculeatus.*

2. *VIOLO DEHNHARDTII-QUERCETUM SUBERIS* ass. nova hoc loco (holotypus rel. n. 4, Tab. 7), Tab. 7, rel. 1-24, Fig. 7.

2a. *oenanthetosum pimpinelloidis* subass. nova hoc loco (holotypus rel. n. 4, Tab. 7), Tab. 7, rel. 1-13.

2b. *myrtetosum communis* subass. nova hoc loco (holotypus rel. n. 19, Tab. 7), Tab. 7, rel. 14-24.

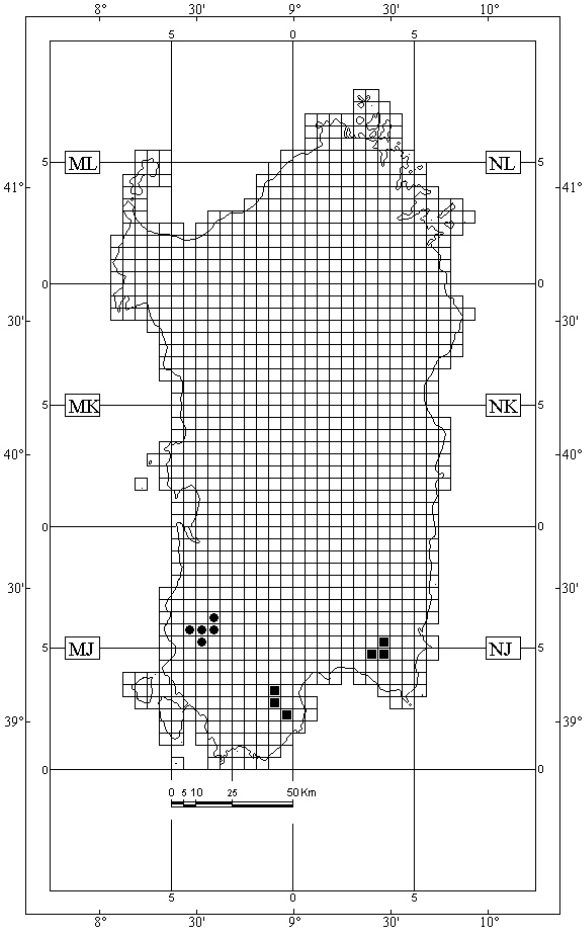

Fig. 6 - Relevées location of the ass. *Galio scabri-Quercetum suberis* (*quercetosum ilicis* = ■; *rhamnetosum alaterni* subass. nova = ●)

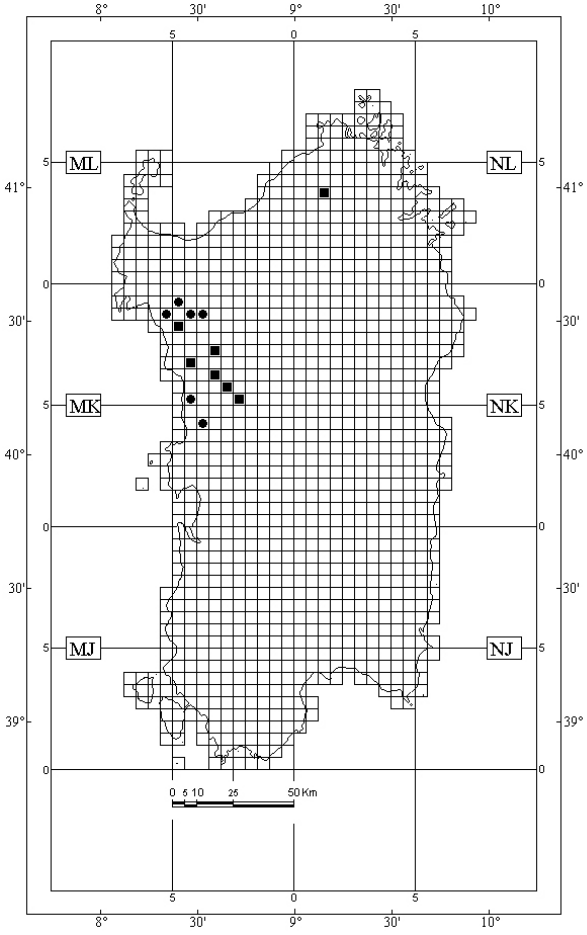

Fig. 7 - Relevées location of the ass. *Violo dehnhardtii-Quercetum suberis* ass. nova (*oenanthetosum pimpinelloidis* subass. nova = ■; *myrtetosum communis* subass. nova = ●)

Tab. 6 - *Galio scabri-Quercetum suberis* Rivas-Martìnez, Biondi, Costa & Mossa 2003
quercetosum suberis Rivas-Martìnez, Biondi, Costa & Mossa 2003
rhamnetosum alaterni subass. nova (holotypus ril. n. 14)

	Rel. n.	1	2	3	4	5	6	7	8	9	10	11	12	13	14*	15	P
	Altitude (m slm)	400	240	265	255	200	250	375	420	400	380	550	370	440	320	450	r
	Exposure	SE	SSE	ENE	ESE	NW	ESE	N	N	NW	NNW	ESE	ESE	E	NE	WSW	e
	Slope (°)	30	30	5	10	30	10	25	10	5	20	45	30	35	45	25	s.
	Substratum (Gra =Granite; Met=Metamorphic)	Gra	Gra	Gra	Gra	Gra	Gra	Gra	Gra	Gra	Gra	Met	Met	Met	Met	Met	
	Stone percentage (%)	5	.	.	.	70	10	20	20	10	10	10	20	10	10	.	
	Area (m^2)	200	100	100	100	100	100	200	200	200	100	100	80	100	100	100	
	Coverage (%)	80	100	90	90	90	90	90	100	90	90	90	100	90	100	80	
	Average vegetation height (m)	8	10	12	12	13	12	11	10	12	9	8	11	12	10	8	
	Charact. and diff. taxa of the ass.																
P scap	*Quercus suber* L.	4	4	4	4	5	4	5	5	5	4	4	5	4	4	4	15
H scap	*Galium scabrum* L.	+	1	1	2	.	1	1	1	+	+	.	1	2	+	.	12
Ch frut	*Ruscus aculeatus* L.	.	.	+	.	+	1	.	+	1	+	+	+	.	.	.	8
	Diff. taxa of the *quercetosum suberis* subass.																
P caesp	*Arbutus unedo* L.	1	2	2	2	1	3	2	2	2	2	.	.	.	.	.	10
P caesp	*Erica arborea* L.	2	3	3	3	3	2	2	+	1	1	.	.	.	.	.	10
P caesp	*Phillyrea latifolia* L.	.	1	2	1	2	1	.	+	+	+	.	.	.	.	.	8
P caesp	*Viburnum tinus* L.	.	.	2	1	+	2	1	2	1	+	.	.	.	.	.	8
P caesp	*Myrtus communis* L.	.	1	2	1	2	1	.	.	+	+	.	.	.	.	.	7
P lian	*Lonicera implexa* Aiton	.	1	1	1	.	+	.	+	.	+	.	.	.	.	.	6
P scap	*Juniperus oxycederus* L. ssp. *oxycedrus*	.	.	1	+	1	+	.	.	.	.	.	.	.	.	.	4
	Diff. taxa of the *rhamnetosum alaterni* subass.																
NP	*Rosa sempervirens* L.	.	.	.	.	.	.	.	+	.	.	1	1	2	1	1	6
P caesp	*Cytisus villosus* Pourr.	.	.	.	.	.	.	.	.	.	.	3	4	4	4	3	5
G rhiz	*Arisarum vulgare* Targ.-Tozz.	.	.	.	.	.	.	.	.	.	.	2	2	2	+	+	5
P caesp	*Rhamnus alaternus* L.	.	.	.	.	.	.	.	.	.	.	+	+	+	1	+	5
P lian	*Hedera helix* L. ssp. *helix*	.	.	.	.	.	.	.	.	.	.	1	1	.	1	+	4
H scap	*Achillea ligustica* All.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	+	4
P caesp	*Olea europaea* L. var. *sylvestris* Brot.	.	.	.	.	.	.	.	.	.	.	2	.	1	1	.	3
	Charact. and diff. taxa of the *Clematido cirrhosae-Quercenion ilicis* suball. and of the *Fraxino orni-Quercion ilicis* all.																
G bulb	*Cyclamen repandum* Sibth. *et* Sm.	+	2	2	2	2	2	1	3	2	2	+	.	.	.	.	11
P lian	*Clematis cirrhosa* L.	.	.	.	.	.	+	.	.	.	.	.	+	2	1	+	5
G rad	*Tamus communis* L.	.	.	.	.	1	.	.	.	+	.	1	.	+	.	+	5
NP	*Cistus creticus* L. ssp. *eriocephalus* (Viv.) Greuter *et* Burdet	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	2
	Charact. and diff. taxa of the upper units																
P lian	*Rubia peregrina* L.	1	1	1	1	1	1	+	+	+	1	+	1	+	1	+	15
H scap	*Pulicaria odora* (L.) Rchb.	1	1	1	2	1	2	2	1	+	1	1	1	2	.	+	14
G rhiz	*Asparagus acutifolius* L.	1	+	+	.	+	+	.	+	+	+	1	1	1	+	1	13
NP	*Smilax aspera* L.	+	+	+	+	+	1	+	+	.	.	2	1	2	1	+	13
H ros	*Asplenium onopteris* L.	+	+	.	.	+	1	1	2	1	1	+	1	.	1	+	12
H caesp	*Carex distachya* Desf.	+	.	+	.	2	+	+	+	+	.	.	1	+	2	1	11
P scap	*Quercus ilex* L.	+	+	+	1	1	.	1	+	+	1	+	.	.	.	.	10
G rhiz	*Limodorum abortivum* (L.) Swartz	+	.	.	.	.	.	1	1	+	1	.	.	.	.	.	5
Ch rept	*Selaginella denticulata* (L.) Link	.	+	.	.	+	1	+	.	.	+	.	.	.	.	.	5
P caesp	*Daphne gnidium* L.	+	.	+	+	.	.	.	.	.	+	.	.	.	.	.	4
NP	*Osyris alba* L.	.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	3
P caesp	*Pistacia lentiscus* L.	.	+	.	.	+	+	.	.	.	.	.	.	.	.	.	3
	Other species																
H caesp	*Luzula forsteri* (Sm.) DC.	+	.	1	1	+	2	+	+	+	1	.	.	+	1	1	12
NP	*Rubus* gr. *ulmifolius* Schott	.	.	+	+	.	.	.	+	+	.	1	1	1	+	1	9
NP	*Cistus salvifolius* L.	+	+	+	+	+	.	+	.	+	.	.	.	+	.	.	8
G rhiz	*Asphodelus ramosus* L. ssp. *ramosus*	+	+	+	.	1	.	.	.	+	.	.	.	1	.	+	7
H caesp	*Brachypodium sylvaticum* (Hudson) Beauv.	.	.	.	.	.	+	+	+	.	.	1	1	+	1	+	7
G bulb	*Allium triquetrum* L.	.	.	.	.	.	+	.	.	.	.	+	+	+	.	+	5
	Accidental species	2	2	1	0	1	1	0	0	0	0	1	2	5	2	3	

Tab. 7 - *Violo dehnhardtii-Quercetum suberis* ass. nova (holotypus ril. n. 4)
oenanthetosum pimpinelloidis subass. nova (holotypus ril. n. 4)
myrtetosum communis subass. nova (holotypus ril. n. 19)

	Rel. n.	1	2	3	4*	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19*	20	21	22	23	24	P
	Altitude (m slm)	300	500	500	500	500	450	600	400	700	200	300	650	530	450	450	250	200	180	200	200	150	100	150	50	r
	Exposure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	SE	ESE	N	W	0	0	0	NNW	0	0	e
	Slope (°)	0	0	0	0	0	0	0	0	0	0	0	0	0	5	10	15	5	10	0	0	0	5	0	0	s.
	Substratum (Bas=Basalt; Gra=Granite; Rio=Rhyolite)	Rio	Rio	Rio	Rio	Rio	Rio	Bas	Bas	Bas	Rio	Rio	Rio	Gra	Rio	Rio	Rio	Rio	Rio	Rio	Rio	Rio	Rio	Bas	Rio	
	Stone percentage (%)	10	2	5	6	5	0	0	5	5	5	10	0	10	15	20	10	15	15	15	15	20	30	5	20	
	Area (m²)	200	50	40	100	100	200	150	100	200	100	40	50	200	100	60	100	200	200	300	200	80	100	80	80	
	Coverage (%)	100	90	90	95	95	95	90	90	100	100	85	100	100	100	100	100	100	100	100	100	90	100	90	100	
	Average vegetation height (m)	12	6	4	10	12	10	12	12	8	8	15	5	8	9	6	10	3	4	6	6	5	5	6	6	
	Charact. and diff. taxa of the ass.																									
P scap	*Quercus suber* L.	4	4	4	4	4	4	4	4	3	4	3	4	5	4	4	3	4	4	4	3	4	4	4	5	24
H ros	*Viola alba* Besser ssp. *dehnhardtii* (Ten.) W. Becker	1	+	.	1	2	1	.	1	2	2	+	+	+	.	.	.	.	.	1	2	.	.	.	.	13
H caesp	*Luzula forsteri* (Sm.) DC.	1	+	1	2	1	1	+	.	3	3	2	.	.	.	.	.	.	.	1	+	.	.	.	.	12
H caesp	*Brachypodium sylvaticum* (Hudson) Beauv.	+	1	1	2	2	+	+	.	2	2	1	.	.	.	.	.	.	.	+	.	.	.	.	+	12
H scap	*Oenanthe pimpinelloides* L.	.	+	.	1	1	1	3	1	.	+	1	1	.	.	.	.	.	.	+	+	.	.	.	.	11
P caesp	*Pyrus amygdaliformis* Vill.	.	+	.	+	.	.	.	+	.	.	+	.	.	+	+	.	+	+	+	.	.	.	+	+	11
P caesp	*Crataegus monogyna* Jacq.	+	.	.	+	.	1	.	1	1	+	.	+	.	.	+	1	.	.	.	.	.	.	.	+	+	11
P lian	*Hedera helix* L. ssp. *helix*	1	.	.	1	.	1	.	1	2	1	1	.	2	.	.	.	.	.	.	.	.	.	.	.	.	8
	Diff. taxa of the *myrtetosum communis* subass.																									
P caesp	*Myrtus communis* L.	.	.	.	.	.	.	.	.	.	.	2	.	.	1	+	1	2	2	2	2	3	1	3	2	12
P caesp	*Pistacia lentiscus* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	2	1	2	1	1	2	2	1	10
G rhiz	*Arisarum vulgare* Targ.-Tozz.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	2	2	2	2	2	2	2	2	2	1	10
P caesp	*Calicotome spinosa* (L.) Link	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	1	1	+	+	.	.	+	8
P scap	*Quercus ilex* L.	.	.	.	+	.	.	.	.	.	.	.	.	1	+	+	2	1	1	.	.	.	.	.	.	7
	Charact. and diff. taxa of the *Clematido cirrhosae-Quercenion ilicis* suball. and of the *Fraxino orni-Quercion ilicis* all.																									
G rad	*Tamus communis* L.	1	1	.	1	1	.	.	1	.	.	.	.	+	.	.	.	+	+	+	1	.	.	1	.	11
P caesp	*Quercus ichnusae* Mossa, Bacchetta *et* Brullo	.	.	.	.	.	.	.	1	1	+	1	.	1	+	2	1	+	.	.	.	.	.	.	.	8
P caesp	*Quercus dalechampii* Ten.	.	.	.	.	.	.	.	1	1	.	.	.	1	+	1	.	.	.	.	.	.	.	.	.	5
P lian	*Clematis cirrhosa* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	+	3
P scap	*Fraxinus ornus* L.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	1
NP	*Cistus creticus* L. ssp. *eriocephalus* (Viv.) Greuter *et* Burdet	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1
	Charact. and diff. taxa of the upper units																									
P lian	*Rubia peregrina* L.	+	1	1	1	2	+	.	1	1	+	.	.	2	+	1	+	1	1	1	1	1	1	+	1	21
NP	*Smilax aspera* L.	+	+	1	3	1	.	.	2	+	.	.	+	2	1	+	.	1	2	1	1	1	1	1	+	19
NP	*Rosa sempervirens* L.	+	.	.	2	1	2	+	1	1	+	1	.	+	+	+	2	1	.	1	.	2	1	+	1	19
H caesp	*Carex distachya* Desf.	.	1	1	1	1	2	1	.	.	1	+	2	.	.	1	.	.	.	+	+	1	1	1	2	16
H scap	*Pulicaria odora* (L.) Rchb.	1	+	.	1	+	1	+	.	.	2	.	.	.	.	2	.	1	1	+	1	+	.	1	+	15
P lian	*Lonicera implexa* Aiton	+	.	1	1	1	.	.	.	.	.	.	+	+	1	.	1	+	2	2	2	.	1	1	1	15
P caesp	*Arbutus unedo* L.	2	1	1	1	.	.	.	.	.	.	.	+	2	2	+	1	3	2	4	4	.	.	.	.	14
P caesp	*Erica arborea* L.	+	+	+	1	.	.	.	.	+	+	.	+	+	+	.	+	1	1	1	2	.	.	.	.	14
G rhiz	*Asparagus acutifolius* L.	+	.	.	.	+	+	.	1	2	.	.	.	1	+	1	+	.	+	+	.	+	1	.	1	14
H ros	*Asplenium onopteris* L.	1	.	+	1	1	+	.	.	+	+	.	.	+	.	.	+	.	1	.	.	.	.	.	.	10
P caesp	*Daphne gnidium* L.	.	.	+	+	.	.	.	.	+	+	.	.	.	1	.	.	.	.	+	+	.	+	.	+	9
P caesp	*Phillyrea latifolia* L.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	.	2	.	.	.	.	.	.	3
NP	*Euphorbia characias* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.	.	3
P caesp	*Phillyrea angustifolia* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	+	2
P caesp	*Rhamnus alaternus* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	2
Ch frut	*Prasium majus* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	2
NP	*Osyris alba* L.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	2
Ch frut	*Ruscus aculeatus* L.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	1
NP	*Chamaerops humilis* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
H caesp	*Stipa bromoides* (L.) Dorfl.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Ch rept	*Selaginella denticulata* (L.) Link	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1
P caesp	*Calicotome villosa* (Poiret) Link	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1
P caesp	*Olea europaea* L. var. *sylvestris* Brot.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1
H caesp	*Carex hallerana* Asso	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1
	Other species																									
NP	*Rubus* gr. *ulmifolius* Schott	1	1	1	2	3	2	2	1	1	1	2	+	.	1	2	+	.	.	1	1	+	+	1	+	21
G bulb	*Allium triquetrum* L.	1	1	.	2	2	2	+	2	.	+	.	.	.	.	+	1	1	+	+	+	1	1	2	.	17
P caesp	*Cytisus villosus* Pourr.	1	+	.	+	+	1	.	.	.	.	+	.	1	+	.	2	.	.	+	+	.	.	.	.	11
G rhiz	*Pteridium aquilinum* (L.) Kuhn	2	1	+	2	2	2	2	1	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	10
H scap	*Ranunculus bulbosus* L. ssp. *aleae* (Willk.) Rouy *et* Fouc.	+	+	+	+	1	+	1	1	.	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	10
P caesp	*Prunus spinosa* L.	.	.	.	.	.	+	.	+	.	+	+	+	.	.	.	+	.	+	.	.	.	.	1	.	8
NP	*Cistus monspeliensis* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	+	.	1	+	.	+	+	.	+	8
NP	*Cistus salvifolius* L.	.	.	.	.	.	.	.	.	+	.	.	1	.	.	.	.	+	.	+	+	.	.	.	.	5
H scap	*Satureja vulgaris* (L.) Fritsch ssp. *orientalis* (Bothmer) Greuter *et* Burdet	.	.	.	+	+	.	.	.	1	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	5
H caesp	*Brachypodium retusum* (Pers.) Beauv.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	1	.	.	.	+	.	.	.	.	.	5
H caesp	*Carex divulsa* Stockes	.	.	.	1	.	1	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	4
H scap	*Eryngium tricuspidatum* L.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	1	4
G rhiz	*Ambrosinia bassii* L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	1	4
	Accidental species	0	0	1	3	2	1	3	1	0	2	2	4	0	1	2	1	0	1	3	4	0	2	0	0	

To this association are referred the neutro-acidophylous mesowoods of cork-oak found in the mesomediterranean, subhumid-humid phytoclimatic belt on the Plio-Pleistocenic and Oligo-Miocenic volcanic substrata of north-western Sardinia, at altitude between 50 and 700 m. This association prefers flat areas, corresponding to the volcanic highplains of Logudoro, Mejlogu, Planargia, Montiferru, Campeda and Abbasanta where, because of the fertility of the soils and the good amount of precipitation (700-1000 mm/year), the intense pastoral use, with the formation of wooded pastures (*dehesa* landscape) prevails over the forestry use, related to the extraction of the cork. In the lower mesomediterranean, subhumid phytoclimatic belt, at altitude between 50 and 450 m, the thermophylous subassociation *myrtetosum communis* has been found, which can also penetrate the upper thermo-mediterranean, upper dry belt, in ecological conditions of edaphic compensation. The typical subassociation *oenanthetosum pimpinelloidis* grows instead in the upper mesomediterranean, upper subhumid-lower humid phytoclimatic belt, at altitude between 200 and 700 m.

With respect to the association *Galio scabri-Quercetum suberis*, the differential taxa of the association are: *Viola alba* ssp. *dehnhardtii*, *Oenanthe pimpinelloides*, *Hedera helix*, *Pyrus amygdaliformis* and *Crataegus monogyna*.

The association *Violo dehnhardtii-Quercetum suberis* substitutes for the preceeding one on the effusive substrata, spread mainly in the north-western sector of Sardinia (Carmignani *et al*., 2001), on the hydromorphic soils with a clay texture and with slow drainage. On granite substrata (rel. n. 13 of Tab. 7), the association is able to grow only in humid bioclimatic conditions, on the flat areas of the highplains of Aggius, Calangianus, Berchidda, Monti, Buddusò and Alà dei Sardi (north-eastern Sardinia), where it substitutes for the association *Galio scabri-Quercetum suberis*, which is specific of the lower Mesomediterranean, subhumid belt.

The particularity of this association is the interaction between the Mediterranean elements (dominating) with those more mesophilous of the *Querco-Fagetea* class, which is of great phytogeographic significance (Izco *et al*., 1987). Other coenoses of *Q. suber* also have floristic affinities with the class *Querco-Fagetea*: besides the subassociation *rhamnetosum alterni* of the association *Galio scabri-Quercetum suberis*, this is the case for the association *Quercetum frainetto-suberis* Blasi, Filesi, Fratini & Stanisci 1997 of southern Latium (Blasi *et al*., 1997) and for the association *Cytiseto-Quercetum suberis* n.n. of the region of Kroumirie in Tunisia (Braun-Blanquet, 1952b). Other ecologically similar associations to *Violo dehnhardtii-Quercetum suberis* are: *Genisto aristatae-Quercetum suberis* Brullo 1984 of Sicily (Brullo & Marcenò, 1984); *Helleboro-Quercetum suberis* of southern Italy (Signorello, 1984); *Cytiso-Quercetum suberis* Testi & Lucattini 1994 of Latium (Testi & Lucattini, 1994) and *Carici depressae-Quercetum suberis* Rivas-Martínez 1987, Catalan-Provençal (Rivas-Martínez *et al*., 2001).

Conclusions

The wide ecological amplitude shown by the holm-oak in Sardinia and the geological (Carmignani *et al*., 2001) and phytoclimatic (Arrigoni, 1968; Blasi & Michetti, 2002) heterogeneity of the island, are the basis for the phytocoenotic diversity of the holm-oak woods that are referred to five associations and nine subassociations. From the phytogeographic point of view, it is important to recognise the presence in Sardinia of the association *Galio scabri-Quercetum ilicis*, with three subassociations that substitute for the two described for Corsica. The holm-oak woods of the meso-supramediterranean, subhumid-humid belts of Sardinia are referred to this association. The thermomediterranean and lower mesomediterranean phytoclimatic belts, with dry to subhumid ombrotypes, are occupied by the association *Prasio majoris-Quercetum ilicis* in Sardinia, which in Corsica instead finds a potential environment of reasonable area only in the calcareous *plateau* of Bonifacio (Gamisans, 1991).

While the Sardinian-Corsican thermo- and mesomediterranean holm-oak woods are found to be referred to the same associations, those temperate and supramediterranean are instead found to be referred to different associations: *Ilici-Quercetum ilicis* (Corsican silicicole), *Aceri monspessulani-Quercetum ilicis* (Sardinian calcicole), *Saniculo europaeae-Quercetum ilicis* (Sardinian silicicole). This phytocoenotic diversity comes from the climatic, lithological and floristic diversity of the Sardinian-Corsican montane areas.

In the case of the cork-oak woods, these are more ecologically demanding than the holm-oak woods: they are linked to neutral-acid soils, they prefer flat or slightly sloping areas and they reach their optimal growth in the mesomediterranean, subhumid-humid phytoclimatic belt.

The Sardinian-Corsican holm-oak and cork-oak woods represent the western limit of the central-Mediterranean, European alliance *Fraxino orni-Quercion ilicis*, because of the presence in Sardinia of characteristic and differential entities of the same alliance (Biondi *et al*., 2003), many of which find in Sardinia and Corsica the western limit of their distribution area: *Ostrya carpinifolia*, *Fraxinus ornus*, *Quercus virgiliana*, *Q. dalechampii*, *Tamus communis*, *Cyclamen repandum*, *C. hederifolium*, *Cistus creticus* ssp. *creticus* and *C. creticus* ssp. *eriocephalus*. Nevertheless, endemic entities are found in the Sardinian-Corsican holm-oak woods, such as: *Arum pictum* ssp. *pictum*, *Helleborus lividus* ssp. *corsicus*, *Digitalis purpurea* var. *gyspergerae*, *Quercus ichnusae* and *Paeonia morisii* and other western-centred entities sporadic or not present on the Italian peninsula, such as: *Galium scabrum*, *Clematis cirrhosa* and *Teucrium scorodonia*. These entities allow the proposal of the new suballiance *Clematido cirrhosae-Quercenion ilicis* suball. nova hoc loco (typus: *Prasio majoris-Quercetum ilicis* ass. nova) of the alliance *Fraxino orni-Quercion ilicis*, endemic to the Sardinian and Corsican sectors of the Italo-Tyrrhenian Province, according to the biogeographic scheme proposed by Rivas-Martínez *et al*. (2001). This new suballiance includes the Sardinian-Corsican holm-oak and cork-oak coenoses, referred to the following associations: *Pyro amygdaliformis-Quercetum ilicis*, *Prasio majoris-Quercetum ilicis*, *Galio scabri-Quercetum ilicis*, *Aceri monspessulani-Quercetum ilicis*, *Saniculo europaeae-Quercetum ilicis*, *Galio scabri-Quercetum suberis* and *Violo dehnhardtii-Quercetum suberis*, as well as the microwoods of *Olea europea* var. *sylvestris*, recently referred to the associations *Cyclamino repandi-Oleetum sylvestris* and *Myrto communis-Oleetum sylvestris* (Bacchetta *et al*., 2003).

Consequently, the typical suballiance *Fraxino orni-Quercenion ilicis* suball. nova hoc loco (typus *Cyclamino hederifolii-Quercetum ilicis* Biondi, Casavecchia & Gigante 2003, Art. 24b Note and Art. 28) is also here proposed, specific to the Italian peninsula and to Sicily, which has as differential entities: *Carpinus orientalis*, *Coronilla emerus* ssp. *emeroides*, *Festuca exaltata*, *Cercis siliquastrum* and *Calicotome infesta*, all absent in the Sardinian-Corsican flora.

Syntaxonomic scheme

QUERCETEA ILICIS Br.-Bl. ex A. & O. Bolòs 1950
- Quercetalia ilicis Br.-Bl. ex Molinier 1934
  - *Fraxino orni-Quercion ilicis* Biondi, Casavecchia & Gigante 2003
    - *Clematido cirrhosae-Quercenion ilicis* suball. nova
      - *Pyro amygdaliformis-Quercetum ilicis* Biondi, Filigheddu & Farris 2001
      - *Prasio majoris-Quercetum ilicis* ass. nova
        - *quercetosum ilicis* subass. nova
        - *chamaeropetosum humilis* subass. nova
        - *phillyreetosum angustifoliae* subass. nova
        - *quercetosum virgilianae* subass. nova
      - *Galio scabri-Quercetum ilicis* Gamisans (1977) 1986
        - *ilicetosum aquifolii* subass. nova
        - *clematidetosum cirrhosae* (Ubaldi 2003) comb. et stat. nov.
        - *polypodietosum serrulati* subass. nova
      - *Saniculo europaeae-Quercetum ilicis* ass. nova
      - *Aceri monspessulani-Quercetum ilicis* Arrigoni, Di Tommaso & Mele 1985
        - *aceretosum monspessulani* subass. nova
        - *arbutetosum unedonis* subass. nova
      - *Galio scabri-Quercetum suberis* Rivas-Martínez, Biondi, Costa & Mossa 2003
        - *quercetosum suberis* Rivas-Martínez, Biondi, Costa & Mossa 2003
        - *rhamnetosum alaterni* subass. nova
      - *Violo dehnhardtii-Quercetum suberis* ass. nova
        - *oenanthetosum pimpinelloidis* subass. nova
        - *myrtetosum communis* subass. nova

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Accidental species

Tab. 1 – *Pyro amygdaliformis-Quercetum ilicis*
Rel. n. 1: *Geranium purpureum* Vill. 2; rel. n. 2: *Prunus spinosa* L. +; rel. n. 4: *Oryzopsis miliacea* (L.) Asch. *et* Schweinf. ssp. *miliacea* +; rel. n. 5: *Bellis sylvestris* Cyr. +, *Cistus monspeliensis* L. +.

Tab. 2 – *Prasio majoris-Quercetum ilicis*
Rel. n. 1: *Brachypodium sylvaticum* (Hudson) Beauv. +, *Ranunculus bulbosus* L. ssp. *aleae* (Willk.) Rouy *et* Fouc. +, *Ranunculus ficaria* L. +; rel. n. 2: *Brachypodium sylvaticum* (Hudson) Beauv. +, *Iris foetidissima* L. +; rel. n. 4: *Brachypodium sylvaticum* (Hudson) Beauv. +; rel. n. 7: *Umbilicus rupestris* (Salisb.) Dandy +; rel. n. 8: *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcangeli) Pichi-Serm. 1; rel. n. 9: *Brachypodium retusum* (Pers.) Beauv. 1, *Ophrys vernixia* Brot. +; rel. n. 10: *Allium subhirsutum* L. +, *Asphodelus ramosus* L. ssp. *ramosus* +, *Brachypodium retusum* (Pers.) Beauv. +; rel. n. 11: *Aceras anthropophorum* (L.) R. Br. *ex* Aiton *fil.* +, *Allium subhirsutum* L. +, *Asphodelus ramosus* L. ssp. *ramosus* +, *Brachypodium retusum* (Pers.) Beauv. +, *Cistus monspeliensis* L. +, *Cosentinia vellea* (Aiton) Tod. ssp. *vellea* +, *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcangeli) Pichi-Serm. +; rel. n. 12: *Asplenium trichomanes* L. ssp. *quadrivalens* D. E. Mey. +; rel. n. 13: *Allium subhirsutum* L. +; rel. n. 15: *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcangeli) Pichi-Serm. +; rel. n. 16: *Allium subhirsutum* L. +; rel. n. 18: *Leontodon tuberosus* L. +; rel. n. 19: *Umbilicus rupestris* (Salisb.) Dandy +; rel. n. 21: *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcangeli) Pichi-Serm. 1, *Rubus* gr. *ulmifolius* Schott 2; rel. n. 22: *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcangeli) Pichi-Serm. +, *Rubus* gr. *ulmifolius* Schott 1;rel. n. 23: *Allium subhirsutum* L. +, *Asphodelus ramosus* L. ssp. *ramosus* +, *Cistus monspeliensis* L. +, *Geranium purpureum* Vill. +, *Melica arrecta* O. Kuntze +, *Rosmarinus officinalis* L. +, *Urginea maritima* (L.) Baker +; rel. n. 24: *Allium subhirsutum* L. 1, *Asphodelus ramosus* L. ssp. *ramosus* +, *Cistus monspeliensis* L. 1, *Geranium purpureum* Vill. +, *Rosmarinus officinalis* L. +; rel. n. 25: *Allium subhirsutum* L. 1, *Asphodelus ramosus* L. ssp. *ramosus* +, *Cistus monspeliensis* L. +; rel. n. 26: *Ambrosinia bassii* L. 1, *Ranunculus bulbosus* L. ssp. *aleae* (Willk.) Rouy *et* Fouc. +, *Rubus* gr. *ulmifolius* Schott +; rel. n. 27: *Rubus* gr. *ulmifolius* Schott +; rel. n. 28: *Brachypodium retusum* (Pers.) Beauv. +, *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcangeli) Pichi-Serm. +, *Rubus* gr. *ulmifolius* Schott +, *Scrophularia trifoliata* L. +; rel. n. 29: *Pyrus amygdaliformis* Vill. +, *Rubus* gr. *ulmifolius* Schott 1; rel. n. 30: *Rosmarinus officinalis* L. 1, *Carex flacca* Schreber ssp. *serrulata* (Biv.) Greuter 1; rel. n. 31: *Pinus pinea* L. 1; rel. n. 33: *Cistus monspeliensis* L. +; rel. n. 34: *Brachypodium retusum* (Pers.) Beauv. +, *Cistus monspeliensis* L. +; rel. n. 35: *Cistus salvifolius* L. +, *Luzula forsteri* (Sm.) DC. 1, *Orchis longicornu* Poiret +, *Prunus spinosa* L. +, *Pteridium aquilinum* (L.) Kuhn 1, *Rubus* gr. *ulmifolius* Schott +; rel. n. 36: *Cistus monspeliensis* L. +, *Cistus salvifolius* L. +, *Luzula forsteri* (Sm.) DC. +, *Orchis longicornu* Poiret +, *Pteridium aquilinum* (L.) Kuhn 2, *Rubus* gr. *ulmifolius* Schott 1; rel. n. 38: *Brachypodium sylvaticum* (Hudson) Beauv. 1, *Melica arrecta* O. Kuntze +, *Ranunculus ficaria* L. +, *Ranunculus flabellatus* Desf. +, *Rubus* gr. *ulmifolius* Schott +; rel. n. 39: *Ophrys sphecodes* Mill. ssp. *praecox* Corrias +, *Spartium junceum* L. +, *Vitis vinifera* L. ssp. *sylvestris* (Gmelin) Hegi +; rel. n. 40: *Melica arrecta* O. Kuntze +, *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcangeli) Pichi-Serm. +; rel. n. 41: *Melica arrecta* O. Kuntze +, *Ophrys lutea* Cav. +, *Oryzopsis miliacea* (L.) Asch. *et* Schweinf. ssp. *miliacea* +, *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcangeli) Pichi-Serm. +; rel. n. 42: *Allium subhirsutum* L. +, *Carex flacca* Schreber ssp. *serrulata* (Biv.) Greuter +, *Ruta chalepensis* L. +, *Spartium junceum* L. +; rel. n. 43: *Ruta chalepensis* L. +, *Spartium junceum* L. +; rel. n. 44: *Acanthus mollis* L. +, *Allium subhirsutum* L. +, *Cornus sanguinea* L. +, *Lathyrus clymenum* L. +, *Rubus* gr. *ulmifolius* Schott +, *Smyrnium olusatrum* L. +.

Tab. 3 – *Galio scabri-Quercetum ilicis*
Rel. n. 1: *Clematis vitalba* L. 1; rel. n. 2: *Osmunda regalis* L. +; rel. n. 3: *Cephalanthera longifolia* (Hudson) Fritsch +, *Mycelis muralis* (L.) Dumort. 1, *Prunus avium* L. +, *Satureja vulgaris* (L.) Fritsch ssp. *orientalis* (Bothmer) Greuter *et* Burdet +; rel. n. 4: *Mycelis muralis* (L.) Dumort. 1, *Prunus avium* L. +, *Castanea sativa* Mill. +, *Hypericum perforatum* L. +, *Satureja vulgaris* (L.) Fritsch ssp. *orientalis* (Bothmer) Greuter *et* Burdet +; rel. n. 5: *Clematis vitalba* L. 1, *Rosa canina* L. +; rel. n. 6: *Brachypodium retusum* (Pers.) Beauv. 1; rel. n. 7: *Allium triquetrum* L. 1, *Genista corsica* (Loisel.) DC. +; rel. n. 9: *Taxus baccata* L. 1, *Asplenium trichomanes* L. ssp. *quadrivalens* D. E. Mey. 1; rel. n. 10: *Taxus baccata* L. 2, *Umbilicus rupestris* (Salisb.) Dandy +; rel. n. 14: *Asplenium trichomanes* L. ssp. *quadrivalens* D. E. Mey. +, *Umbilicus rupestris* (Salisb.) Dandy +; rel. n. 15: *Cistus monspeliensis* L. +; rel. n. 18: *Acer monspessulanum* L. +, *Carex divulsa* Stockes +, *Clematis vitalba* L. +, *Prunus spinosa* L. +; rel. n. 19: *Carex divulsa* Stockes +, *Clematis vitalba* L. 1, *Prunus spinosa* L. +.

Tab. 4 – *Saniculo europaeae-Quercetum ilicis*
Rel. n. 3: *Prunus spinosa* L. +; rel. n. 4: *Allium triquetrum* L. 1; rel. n. 6: *Holcus lanatus* L. 1; rel. n. 7: *Holcus lanatus* L. 2; rel. n. 8: *Sambucus nigra* L. +; rel. n. 10: *Allium triquetrum*

L. 1, *Silene alba* (Miller) Krause +, *Vicia incana* Gouan +; rel. n. 11: *Allium triquetrum* L. +, *Potentilla reptans* L. +; rel. n. 12: *Bellis perennis* L. +; rel. 13: *Bellis perennis* L. +; rel. n. 16: *Pyrus amygdaliformis* Vill. +, *Ranunculus bulbosus* L. ssp. *aleae* (Willk.) Rouy *et* Fouc. 1.

Tab. 6 – *Galio scabri-Quercetum suberis*
Rel. n. 1: *Ferula communis* L. ssp. *communis* +, *Teline monspessulana* (L.) Koch +; rel. n. 2: *Lavandula stoechas* L. +, *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcang.) Pichi-Serm. +; rel. n. 3: *Lavandula stoechas* L. +; rel. n. 5: *Polypodium cambricum* L. ssp. *serrulatum* (Sch. *ex* Arcang.) Pichi-Serm. +; rel. n. 6: *Neotinea maculata* (Desf.) Stearn +; rel. n. 11: *Crataegus monogyna* Jacq. +; rel. n. 12: *Crataegus monogyna* Jacq. +, *Oryzopsis miliacea* (L.) Asch. *et* Schweinf. ssp. *miliacea* 1; rel. n. 13: *Crataegus monogyna* Jacq. +, *Cynosurus echinatus* L. +, *Oryzopsis miliacea* (L.) Asch. *et* Schweinf. ssp. *miliacea* 1, *Pteridium aquilinum* (L.) Kuhn +, *Pyrus amygdaliformis* Vill. +; rel. n. 14: *Carex divulsa* Stockes +, *Pteridium aquilinum* (L.) Kuhn 2; rel. n. 15: *Carex divulsa* Stockes 1, *Oryzopsis miliacea* (L.) Asch. *et* Schweinf. ssp. *miliacea* +, *Pteridium aquilinum* (L.) Kuhn 1.

Tab. 7 - *Violo dehnhardtii-Quercetum suberis*
Rel. n. 3: *Dactylis hispanica* Roth +; rel. n. 4: *Calamintha nepeta* (L.) Savi ssp. *glandulosa* (Req.) P. Ball +, *Carex flacca* Schreber ssp. *serrulata* (Biv.) Greuter 1, *Melica arrecta* O. Kuntze +; rel. n. 5: *Calamintha nepeta* (L.) Savi ssp. *glandulosa* (Req.) P. Ball +, *Melica arrecta* O. Kuntze +; rel. n. 6: *Orchis longicornu* Poiret +, rel. n. 7: *Asphodelus ramosus* L. ssp. *ramosus* +, *Bellis sylvestris* Cyr. +, *Leontodon tuberosus* L. +; rel. n. 8: *Arum italicum* Mill. 1; rel. n. 10: *Allium subhirsutum* L. 1, *Ranunculus flabellatus* Desf. +; rel. n. 11: *Orchis laxiflora* Lam. +, *Ranunculus macrophyllus* Desf. 2; rel. n. 12: *Agrimonia eupatoria* L. +, *Festuca arundinacea* Schreber +, *Holcus lanatus* L. +, *Lavandula stoechas* L. +; rel. n. 14: *Leontodon tuberosus* L. +; rel. n. 15: *Bellis sylvestris* Cyr. +, *Spartium junceum* L. +; rel. n. 16: *Leontodon tuberosus* L. +; rel. n. 18: *Geranium purpureum* Vill. 1; rel. n. 19: *Cytinus hypocistis* (L.) L. +, *Geranium lucidum* L. +, *Oryzopsis miliacea* (L.) Asch. *et* Schweinf. ssp. *miliacea* +; rel. n. 20: *Asphodelus ramosus* L. ssp. *ramosus* +, *Orchis longicornu* Poiret +, *Orchis provincialis* Balb. +, *Oryzopsis miliacea* (L.) Asch. *et* Schweinf. ssp. *miliacea* +; rel. n. 22: *Geranium lucidum* L. +, *Spartium junceum* L. +.

Localities, dates and references of the relevés

Tab. 1

Nr. of rel.	Author/s	Orig. Nr.	Date and locality
1	Farris	42	14.III.01 Mt Ricciu – ALGHERO (SS)
2	Farris	145	7.V.02 Valverde – ALGHERO (SS)
3, 4, 5	Biondi *et al*., 2001	1, 2, 3, Tab. 63	30.X.00 Bonassai – SASSARI

Tab. 2

Nr. of rel.	Author/s	Orig. Nr.	Date and locality
1, 2, 3, 4	Farris	223, 224, 225, 226	3.III.02 Mt Zirra, loc. Sa Coa de Su Soldatu – ALGHERO (SS)
5	Farris	222	2.III.02 Mt Zirra, loc. Sa Coa de Su Soldatu – ALGHERO (SS)
6	Bacchetta	6 (32/00)	10.IV.00 Mt Luas – SARROCH (CA)
7	Bacchetta	8 (7/99)	22.IV.99 Mt Luas – SARROCH (CA)
8	Bacchetta	7 (61/00)	19.IV.00 Punta Portellettus - Mt Tamara – NUXIS (CA)
9	Bacchetta	2 (26/97)	5.V.97 Bivio Teulada-Giba – TEULADA (CA)
10	Bacchetta	3 (72/00)	13.V.00 Grotte di Is Zuddas – SANTADI (CA)
11	Bacchetta	4 (74/00)	13.V.00 Nuraghe Montiallo – SANTADI (CA)
12	Bacchetta	11 (Q22)	9.IV.94 Moddizzi Manna – UTA (CA)
13	Bacchetta	14 (Q21)	10.IV.93 S. Antonio – ASSEMINI (CA)
14	Bacchetta	15 (4/00)	4.II.00 Case Boero – ASSEMINI (CA)
15	Bacchetta	16 (18/00)	14.III.00 Diga di Santa Lucia – ASSEMINI (CA)
16	Bacchetta	13 (Q16)	16.V.92 Miniere Serra Nieddu – ASSEMINI (CA)
17, 18	Biondi *et al*. 2001	5, 6, Tab. 62	14.I.01 Punta Giglio – ALGHERO (SS)
19	Farris	55	23.III.01 Scala Piccada – ALGHERO (SS)
20	Farris	231	29.III.02 Lago di Baratz – SASSARI
21, 22	Biondi *et al*. 2001	7, 8, Tab. 62	12.II.01 Porto Ferro – SASSARI
23, 24, 25	Biondi *et al*. 2001	1, 2, 3, Tab. 62	28.IV.00 Arca di Noé – ALGHERO (SS)
26, 27	Farris	228, 229	17.III.02 P.ta Ruja-P.ta Lu Colbu, Mt Forte – SASSARI
28	Bagella and Biondi	7	24.VI.99 Mt Tejalone, Caprera – LA MADDALENA (SS)
29	Farris	233	29.III.02 Lago di Baratz – SASSARI
30	Biondi *et al*. 2001	1, Tab. 61	2.VII.00 Rocca Stampata – STINTINO (SS)
31	Bagella and Biondi	1	24.VI.99 Mt Tejalone, Caprera – LA MADDALENA (SS)
32	Bagella and Biondi	3	1.VIII.88 - Mt Tejalone, Caprera – LA MADDALENA (SS)
33, 34	Bagella and Biondi	4, 5	5.VIII.91 Mt Tejalone, Caprera – LA MADDALENA (SS)
35, 36	Farris	46, 47	14.III.01 Demanio Forestale Putifigari – PUTIFIGARI (SS)
37	Farris	60	30.III.01 s.s. 127bis, loc. Monterga – URI (SS)
38	Farris	61	30.III.01 s.s. 127bis, loc. Monterga – URI (SS)
39	Farris	63	4.IV.01 Sos Torriones, Chighizzu – OSSI (SS)
40, 41	Farris	68, 69	6.IV.01 Chighizzu-Setti Funtani – SASSARI
42	Filigheddu and Bagella	1a	21.IX.2001 Mt Forru – SASSARI
43	Filigheddu and Bagella	2a	21.IX.2001Mt Forru – SASSARI
44	Filigheddu and Bagella	11	21.IX.2001 Funtana Chighizzu, Badde Olia – SASSARI

Tab. 3

Nr. of rel.	Author/s	Orig. Nr.	Date and locality
1	Farris	85	27.IV.01 Bau 'e Mela-Su Lidone – SANTULUSSURGIU (OR)
2	Farris	182	7.VI.02 Bau 'e Mela – SANTULUSSURGIU (OR)
3	Farris	180	7.VI.02 Bau 'e Mela – SANTULUSSURGIU (OR)
4	Farris	25	27.IV.01 Funtana e s'Ozzu – CUGLIERI (OR)
5	Farris	86	27.IV.01 Bau 'e Mela-Su Lidone – SANTULUSSURGIU (OR)
6	Farris	206	22.VI.01 Rio Ermolinus, For. Dem. Montarbu– SEUI (NU)
7, 8	Farris	216, 217	23.VI.01 Rio Ermolinus, For. Dem. Montarbu – SEUI (NU)
9	Bacchetta	33 (Q3)	13.IV.90 C.le Longufresu – UTA (CA)

10	Bacchetta	34 (Q7)	15.IV.90 C.le Longufresu – UTA (CA)
11	Farris	181	7.VI.02 Bau 'e Mela – SANTULUSSURGIU (OR)
12	Farris	183	7.VI.02 Bau 'e Mela – SANTULUSSURGIU (OR)
13	Bacchetta	25 (48/99)	6. XI. 99 S'Arcu 'e s'Olioni – PULA (CA)
14	Bacchetta	23 (Q2)	12.IV.90 C.le Longufresu – UTA (CA)
15	Bacchetta	24 (28/99)	27.V.99 S'Arcu 'e s'Olioni – PULA (CA)
16, 17, 18, 19	Farris	160, 161, 162, 163	20.V.02 Sa Pittada – BOSA (NU)

Tab. 4

Nr. of rel.	Author/s	Orig. Nr.	Date and locality
1	Farris	26	5.I.01 La Madonnina – SANTULUSSURGIU (OR)
2, 3	Farris	198, 200	26.VII.02 Littu Majore, For. Dem. Anela – ANELA (SS)
4	Farris	30	5.I.01 Rio s'Abba Lughida, La Madonnina – SANTULUSSURGIU (OR)
5	Farris	29	5.I.01 Rio s'Abba Lughida, La Madonnina – SANTULUSSURGIU OR)
6, 7	Farris	122, 123	5.VIII.01 Sa Minda 'e Bassu, Foresta Demaniale Anela – ANELA (SS)
8	Farris	27	15.VI.01 La Madonnina – SANTULUSSURGIU (OR)
9	Farris	106	11.VI.01 Loc. Nuradorzu, For. Dem. Anela – ANELA (SS)
10	Farris	28	15.VI.01 Badde Urbara – SANTULUSSURGIU (OR)
11	Bacchetta	16 (50/99)	6.XI.99 Rio Sarpas – PULA (CA)
12, 13, 14	Farris	79, 80, 81	11.IV.01 Mt Funtanas – SENEGHE (OR)
15	Farris	84	27.IV.01 Bau 'e Mela-Su Lidone – SANTULUSSURGIU (OR)
16	Farris	197	24.V.02 P.ta Masiennera – ANELA (SS)

Tab. 5

Nr. of rel.	Author/s	Orig. Nr.	Date and locality
1	Bacchetta	4 (36/99)	3.VI.99 Punta Sebera – PULA (CA)
2	Bacchetta	5 (33/99)	3.VI.99 Punta Sebera – PULA (CA)
3	Bacchetta	3 (64/98)	21.V.98 Is Arangius – PULA (CA)
4	Bacchetta	6 (30/99)	27/5/99 Mt Padenteddu – PULA (CA)

Tab. 6

Nr. of rel.	Author/s	Orig. Nr.	Date and locality
1	Bacchetta	9 (4/97)	9.V.97 Campuomu – BURCEI (CA)
2	Bacchetta	1 (S24)	25.IV.92 Mt Nieddu – VILLA SAN PIETRO (CA)
3	Bacchetta	19 (S3)	14.IV.92 Is Antiogus – ASSEMINI (CA)
4	Bacchetta	20 (S4)	14.IV.92 Fanebas – ASSEMINI (CA)
5	Bacchetta	6 (S7)	14.IV.92 Is Pauceris – ASSEMINI (CA)
6	Bacchetta	5 (S1)	14.IV.92 Fanebas – ASSEMINI (CA)
7	Bacchetta	10 (2/97)	9.V.97 Campuomu – BURCEI (CA)
8	Bacchetta	11 (5/97)	9.V.97 Campuomu – BURCEI (CA)
9	Bacchetta	22 (3/97)	9.V.97 Campuomu – BURCEI (CA
10	Bacchetta	21 (1/97)	9.V.97 Casermetta AFDRS – BURCEI (CA)
11	Bacchetta and Mossa	6 (S16)	16.IV.92 Genna Bogai – FLUMINIMAGGIORE (CA)
12	Bacchetta and Mossa	8 (S15)	16.IV.92 Mt Sigue – IGLESIAS (CA)
13	Bacchetta and Mossa	9 (S14)	16.IV.92 Mt Sigue – IGLESIAS (CA)
14	Bacchetta and Mossa	7 (S13)	16.IV.92 Mt Sigue – IGLESIAS (CA)
15	Bacchetta and Mossa	10 (S18)	16.IV.92 Mt Miai – IGLESIAS (CA

Tab. 7

Nr. of rel.	Author/s	Orig. Nr.	Date and locality
1	Farris	57	29.IV.01 Ponte Caitta – VILLANOVA M.LEONE (SS)
2, 3, 4, 5, 6	Farris	87, 88, 89, 90, 91	29.IV.01 Altopiano Pittu 'e Corru – VILLANOVA M.LEONE (SS)
7	Farris	96	18.V.01 Campeda – SINDIA (NU)
8	Farris	76	11.IV.01 Altopiano di Abbasanta – ABBASANTA (NU)

9	Farris	64	4.IV.01 Colonia montana Sa Coa de su Attu – BORORE (NU)
10	Farris	93	1.V.01 Costa Cugurrera – BOSA (NU)
11	Farris	95	1.V.01 Palattu di Silva Manna – BOSA (NU)
12	Farris	127	27/9/01 Mt Traessu – GIAVE-COSSOINE (SS)
13	Bagella, Biondi, Farris, Filigheddu	24	20.VII.03 AGGIUS (SS)
14	Farris	11	3.I.01 Mt Fulcadu – VILLANOVA M.LEONE (SS)
15	Farris	31	15.I.01 tra Ittiri e Romana – ROMANA (SS)
16	Farris	18	3.I.01 Mt Minerva – VILLANOVA M.LEONE (SS)
17,18	Biondi, Farris, Filigheddu	37, 38	9.III.01 Mt Rosso – OLMEDO (SS)
19, 20	Biondi, Farris, Filigheddu	40, 41	10.III.01 Mt Rosso – OLMEDO (SS)
21	Farris	50	16.III.01 Torre Foghe – TRESNURAGHES (OR)
22	Farris	54	23.III.01 Scala Piccada – ALGHERO (SS)
23	Farris	83 -	11.IV.01 s.p. 11, km 10 – NARBOLIA (OR)
24	Farris	129	1.III.02 loc. La Quercia – ALGHERO (SS)